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PASADENA SEWER FARM

Practical, Remunerative and Satisfactory—A Matter of Local Pride—Various Obstacles Encountered and Success Attained—Climate and Cultivation

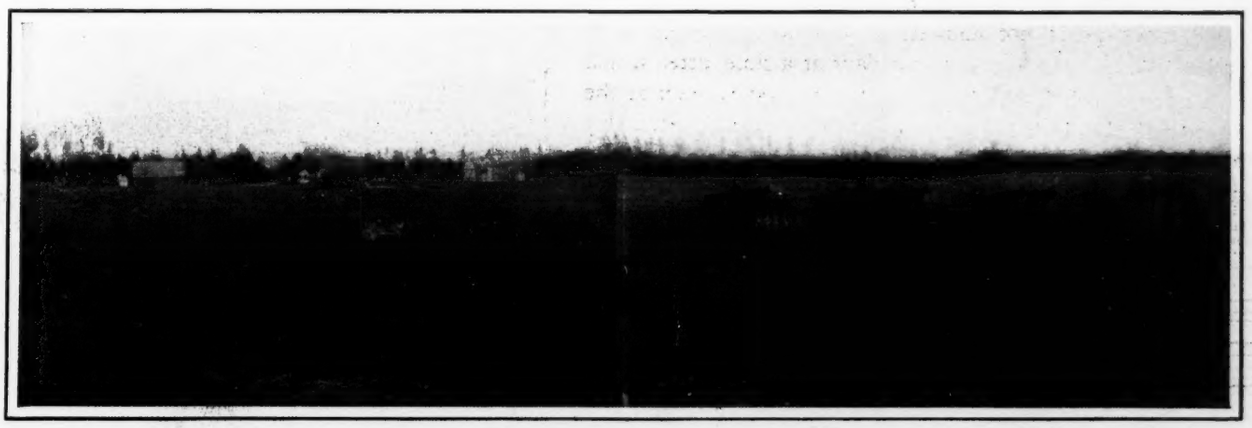
By S. F. PEARSON, City Engineer

THE PASADENA (CAL.) SEWER FARM comprises 460 acres, is situated four and one-half miles southease of the center of Pasadena, Cal., and one mile southeast of the center of the town of Alhambra. On account of the simple method of sewage disposal, which has proved so highly satisfactory from a sanitary standpoint and so remunerative from a financial standpoint, Pasadenans refer to their sewer farm with much pride Three hundred acres were purchased in 1887 at $125 per acre, which at that time were unimproved.

Many were the obstacles encountered by the city officials who undertook to acquire the farm and secure the right-of-way for the main outfall sewer leading thereto, not to mention the difficulty encountered in the disposal of the sewage after the legal entanglements of right-of-way had been settled and the outfall completed. From the south city boundary at the north base of Raymond Hill to a point one-half mile from the sewer farm the main outfall runs along Garfield Avenue, which avenue passes through the extreme eastern part of the town of South Pasadena, a separate municipality incorporated in 1888. Leaving South Pasadena, Garfield Avenue continues on through Alhambra, passing through the business center of the town, which is now also a municipality. As that part of South Pasadena through which the outfall was to pass was sparsely inhabited and the land was owned in large tracts, but little difficulty was experienced in securing a right-of-way, the only condition exacted being a connection with Raymond Hotel through the grounds of which Garfield Avenue passes.

In Alhambra conditions were different. Much of the land along and near Garfield Avenue had been subdivided into residence and business lots, and many houses and some business buildings had been erected. It was there that delay and litigation were encountered. The citizens rose almost en masse. Many conscientiously believed that should the City of Pasadena succeed in its location of sewer and sewer farm their homes and property would be ruined by contagion and pestilence being spread broadcast throughout their beautiful and prosperous community.

Not only did the city officials have the Alhambra people



THE PASADENA SEWER FARM—PURCHASED IN 1887.

to contend with, but many of the most influential citizens of Pasadena believed it unjust for Pasadena to carry its sewage through the streets of our neighboring town, and dispose of it on a sewer farm in its vicinity. These citizens of our own city, while furnishing no financial aid to the Alhambra people, made it extremely annoying to the city officials by their emphatic protests and general criticism of the undertaking.

However, the farm which had been purchased seemed to be the only one available, and the officials were steadfast in their belief that no harm could come to any one by the location of the farm and the outfall leading thereto.

The first crops raised on the farm consisted of barley and wheat, hay, pumpkins, corn and alfalfa, all of which are now successfully raised, except alfalfa, which, being a matted low-growing crop, the roots of which incline to sod, and cultivation being impossible, the solids of the sewage would collect in it on the side of the field next to the head ditch and the results were unsatisfactory conditions. It was finally decided to abandon the raising of alfalfa, although the yields were extraordinary and the profits excellent.

In 1892 sixty acres on the south end of the farm were planted to English walnuts. The trees having made such splendid growth, an additional thirty acres were planted in 1898, and later another twenty-seven acres were planted, making one hundred and seventeen acres in walnuts. During the first few years corn and pumpkins are raised in the walnut groves, but as the groves come into bearing no other crops are raised. The sewage is turned into the bearing groves as soon as the leaves are well off the trees which usually is about December 1.

The sewage is kept in the walnut groves until the foliage comes out on the trees about April 1, the entire flow for the past three or four winters having been disposed of in the groves. After the sewage is taken from the grove about April 1, it is not turned back again until the following December. From April to December the sewage is used in the open fields. At times during the haying or walnut picking when all of the farm help is needed to care for the crops, neighbors take the sewage on their own farms, the opportunity of which they eagerly avail themselves.

Whether being used in the groves or in the open fields, the sewage is not allowed to run upon any one area longer than from four to ten days at a time, after which period it is turned upon another area, and as soon as the area upon which it has been running is sufficiently dry to be worked, which is usually within two or three days, it is thoroughly cultivated or plowed. Frequently the top surface is plowed under, but this is not done after every period of irrigation, as only thorough stirring with a cultivator is necessary. The number of days that the sewage can be allowed to run upon a given area at any one period depends upon the weather and atmospheric conditions. If the weather is hot and dry, the period reaches its maximum, but if the weather is damp and the atmospheric pressure low, when such odors as are present cannot rise readily but are held close to the surface of the ground, the period is the minimum.

Climate and Cultivation

The first secret of the farm's success from a sanitary standpoint is the abundant sunshine and the dry climate of the locality, while the second secret is the thorough and constant cultivation to which the irrigated lands are subjected, which, combined with the first, and a faithful, enthusiastic and intelligent superintendent in charge, are productive of results highly satisfactory to the experienced sanitarian, and surprising to those who have given but little or no thought to this method of disposal. There are times, which are not frequent, when the atmospheric pressure is low, with perhaps a low fog, and the atmosphere at a perfect calm when greater care must be exercised to prevent conditions that are unsatisfactory in the immediate proximity of an area that is being irrigated. Usually one can approach the streams and stand upon their very edge without realizing that they are sewage. In the early morning when the night sewage is being discharged the flow is frequently perfectly clear. Later in the day it is discolored and has a soapy appearance.

SACKING WALNUTS.

At the entrance to the farm a settling tank is located, where the very coarse materials, which but seldom are more than rags, are caught and taken out. All papers are dissolved in the long journey, and are scarcely noticeable even in small particles in the flowing sewage. The most

WASHING WALNUTS.

noticeable solids, other than rags, which on account of their lightness at times collect on the surface where the flow is temporarily retarded, are coffee grounds and corks—the former contributed by coffee drinkers, the latter by other drinkers.

During the summer months, and even during the past few winters when the rainfall has been less than normal, the sewage has required no attention at night. One care-

WALNUTS IN TRAYS.

taker has succeeded in so arranging the flow during the day that his attention has not been necessary during the night.

On account of the rapid growth of the city with the correspondingly increasing quantity of sewage, and the probability of an extremely wet winter when some difficulty might be experienced in keeping the sewage on the

PICKING WALNUTS.

farm, it was decided to purchase one hundred and sixty acres adjoining the original three hundred acres on the north, while there was an opportunity to purchase the same. The said one hundred and sixty acres were purchased about two years ago. For the income, expenses, and profits of the farm for the fiscal year ending July 1, 1905, see the following from the Auditor's Annual Report:

SEWER FARM DEPARTMENT

Receipts

Walnuts	$ 6,900.35
Grain	79.90
Pumpkins	340.28
Pasturage	37.50
Hogs	601.32
Wood	110.33
Burial permits	76.50
Rebate on insurance	37.69
Sundries	10.00
Hay sold	1,955.18
Hay to Fire and Street Departments	434.04
Total	$10,583.09

Disbursements

Salary of Superintendent	$ 875.00
Labor of men on farm	3,912.29
Labor picking walnuts	542.49
Grain and walnut bags	97.32
Baling hay	456.57
Sundry supplies	107.58
Blacksmithing and horseshoeing	15.95
Seed and grain	334.60
Veterinarian and drugs	12.85
Stock	75.80
Insurance on hay	247.50
Tools, repairs and supplies	344.31
Lumber	46.79
Freight and drayage	56.03
Horse clipping	12.00
Horses	800.00
Feed	21.38
Total	$ 7,958.82

SEWER DEPARTMENT

Receipts

Permits, ordinance 303, sewer	$ 715.50

Disbursements

Labor on sewers	$ 508.94
Water for flushing	574.69
Sundry expenses	22.59
Total	$ 1,106.22

SEWER FARM PURCHASE DEPARTMENT

Purchase 160 acres	$12,000.00
Certificate of Title and Recording Deed	6.40
Interest	300.00
Total	$12,306.00

The farm was purchased, and the main outfall constructed, as were several sewers in the principal streets, from funds raised by a bond issue at that time; but all later sewers, except the east side outfall, have been constructed either at the expense of districts, or at the expense of the abutting property owners when the work has been confined to a single street.

From time to time sewers were constructed on various streets until January 1, 1900, when some fifteen miles in all had been completed. About this time the officials started in thoroughly to sewer the city.

It is not amiss at this time to mention that the Miller Flush Tank which is being so widely used by American cities was invented and patented in Pasadena by Mr. Miller, who at the time was employed in the City Engi-

neer's office, and was assisting upon the construction of the outfall and other sewers.

The street sewers range from 8 to 16 inches in diameter. The topography of our city is such that 8-inch sewers, which are the smallest used, are sufficient for about 80 per cent. of our streets, while the trunk lines range up to 16 inches in diameter. No 8-inch sewers are laid on grades less than one-half foot per hundred feet.

The quantity of sewage now being discharged ranges from 1.0 cubic feet per second minimum, at about 7 o'clock A. M. to 2.4 cubic feet per second maximum, at about 11 o'clock A. M., the average being approximately 1.7 cubic feet per second, or 85 miner's inches, which is equivalent to 1,100,000 gallons per twenty-four hours.

We believe that in the arid West, where water is so valuable, and the water plane is constantly lowering more and more rapidly as the quantity used increases, that to dispose of the sewage by piping it to the ocean by nearby cities, unless they be coast cities, is a needless and expensive waste. We realize that where the quantity of sewage is extremely large and the ocean can be reached, that an outfall thereto is necessary to take care of the winter sewage, unless very large farms are owned. From our experience in Pasadena it appears evident that the value of the sewage of any city in an arid country is only less than the value of irrigating water to the extent that the location in which, and the crops for which it can be properly used are more limited; while on the other hand, for such crops as it can be properly used it has a greater value than irrigating water to the extent of its fertilizing value, which is large.

It is claimed that Pasadena is the most thoroughly sewered city in America.

BROOKLYN SEWER SYSTEM

Fifty Years' Experience with Vitrified Clay and Cement Pipe—Arguments of To-day Advanced in 1877—Specifications and Tests

By A. J. PROVOST, Jr.

PRIOR to 1858 there had been constructed in Brooklyn less than seven miles of sewers. These were of brick and intended chiefly for surface drainage. Under an act of the Legislature, passed April 15, 1857, the Board of Water Commissioners of the City of Brooklyn, created February 11, 1857, were authorized "to devise and frame a plan of drainage and sewerage of the city upon a regular system." On September 10, of that year, Julius W. Adams, in a report to the Water Board, outlined a general plan of the proposed design, stating that "the pipe sewers will be of glazed stoneware or cement pipe." At the very inception, therefore, of an enormous system, comprising at this day more than 760 miles of sewers—equal to the combined mileage of sewers in all the other boroughs of Greater New York—we find injected a policy regarding the materials to be used in pipe sewers which has continued to the present day in spite of the controversies which have always existed regarding the relative merits of earthenware and concrete pipe. Except at such intervals when the adherents of one of these classes of pipe have maintained their position by the exclusion in the specifications of the other pipe, the two materials have been admitted in common and are so admitted at the present day.

The early pipe was principally imported Scotch clay pipe. The Chief Engineer's report for 1861 shows 69.37 miles of this material and 5.49 miles of cement pipe laid at the end of that year; the sizes used being 12-inch to 18-inch, inclusive. The cost of these at that date was: 12-inch, $1.21 per lineal foot; 15-inch, $1.56 per lineal foot; 18-inch, $1.97 per lineal foot. Twenty-four inch pipe was first laid in 1862. By this time the preference for cement pipe appears to have become established, and the contract prices per lineal foot were: 12-inch, 79c.; 15-inch, $1.14; 18-inch, $1.35; 24-inch, $1.56. The 24-inch pipe was in use for only a couple of years when the original practice of using brick for this size was returned to until about 1886. The use of egg-shaped cement pipe, with integral flat base was first introduced in 1873. During that and the succeeding two years 53.5 miles in sizes from 12-inch to 18-inch, inclusive, were laid on plank foundations. The Chief Engineer reported for these years that the quality of cement pipe used had been unusually good, being carefully made and thoroughly seasoned.

REPORT OF CHIEF ENGINEER ADAMS

In 1877 the proposition to return to the use of earthenware pipe was adversely reported on by the Chief Engineer, Julius W. Adams, as follows: "The sewer pipe question has been very generally discussed for several years past. The Akron pipe is, I believe, the best American stoneware pipe, but the use of this pipe would add greatly to the cost of our sewerage, and, without giving us any very decided improvement in the material, we would lose the important improvement of shape. One of the advantages in using the cement pipe is to be found in the 'egg-shaped' section. Again, we have found it important to lay all pipe on a single plank, as the bearing is more uniform, and the grade and line more accurately secured. Great care must be taken in filling in, over the round pipe, lest the under part be imperfectly rammed; and in laying pipe with sleeves, it is quite common to find the pipe resting on the sleeves and not resting its entire length upon a firm foundation. In the case of the flat-bottomed pipe there is none of this difficulty. Last winter there were careful inspections made of our pipe sewers. In one subdivision the grades of streets are over two-and-a-half feet to the one hundred, and a special examination was made of the pipe in this subdivision. There is no sign of disintegration or wearing away of the cement pipe. These pipes have been laid over five years. There has been considerable written about the 'acids' acting injuriously upon cement pipe, but these acids in sewerage matter are greatly diluted, and I am convinced by the experience in this city that they will seldom destroy a good cement pipe. We have known of no case in this city where the street sewer has been disintegrated or eaten away by sewer acids or gases.

"The 25th of March, 1873, this Department took up a cement pipe that had been laid in Fleet street in the year 1861, and the pipe was found, in every particular, as good as when laid. The pipe laid in this city is good and durable. Much of the American stoneware pipe is neither regular in section nor well burnt; this regularity is of prime necessity to prevent deposit and is readily attained in the cement pipe, but rarely in a burnt pipe."

It is interesting to note that the arguments advanced by this eminent authority in 1877 are substantially those presented to-day. The clay pipe manufacturers have improved the uniformity of their product with regard to shape and even burning, while the cement pipe makers have improved the strength and density of their wares by substituting Portland cement for Rosendale and by employing machine in place of hand-tamping. The arguments advanced to-day in favor of concrete pipe are based on the egg-shape section, the self-supporting base and the true smooth bore. The argument advanced against it is still confined to possible disintegration by acids. The fact remains, however, that the renewals of sewer pipe in Brooklyn on account of breakage or collapse have been relatively less in the case of concrete than in that of earthenware pipe.

Fifty-four Miles in One Year

In 1895 earthenware pipe was admitted into competition with cement pipe, alternate bids being invited. In his report for that year the Commissioner of City Works stated the cost of sewer construction had been reduced by admitting such competition, although, as stated by the Engineer of Sewers, of all the contracts awarded for pipe sewers in that year, aggregating more than 54 miles and involving 40 contracts, in only four cases were the awards made for earthenware pipe, since in all other cases the bids for cement pipe were lower.

The two classes of pipe remained in active competition until about two years after Brooklyn became a part of New York City, or 1900, when the Bronx-Manhattan specifications permitting the use of salt-glazed vitrified earthenware pipe only went into force. For the succeeding four years all pipe sewers were laid in a concrete cradle six inches below and surrounding the pipe up to the springing line and encased in a timber box with 1¼ inch bottom and sides. The relative cost of 12-inch pipe, which represents about 65 per cent. of all pipe laid, including foundation, during the period from 1897 to 1904, is of interest:

1897	12-inch	cement	or	vitrified	pipe,	$ .74	per	lineal	foot
1898	12-inch	"	"	"	"	.81	"	"	"
1899	12-inch	"	"	"	"	.96	"	"	"
1900	12-inch	vitrified			"	1.21	"	"	"
1901	12-inch	"			"	1.49	"	"	"
1902	12-inch	"			"	1.67	"	"	"
1903	12-inch	"			"	2.36	"	"	"
1904	12-inch	"			"	2.14	"	"	"

In August, 1904, the specifications were again changed so as to permit the use of either vitrified or cement pipe. Physical tests were imposed which both classes must meet, and the contractor was permitted to use both kinds of pipe, except that between adjacent manholes only one kind was allowed. The contractor was required to deliver, when directed, one length of pipe to each 100 feet laid for submission to the following tests:

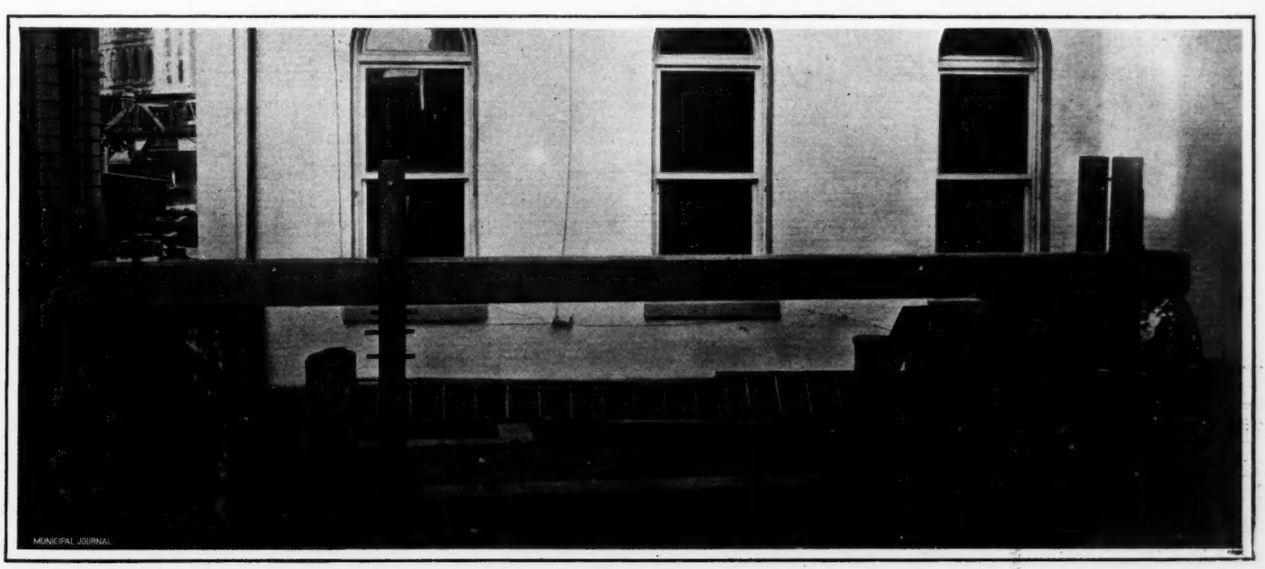
Under compression when buried in sand and with eight inches of the same material over it, 12-inch pipe to sustain 3,000 pounds and larger sizes 4,500 pounds per lineal foot, without cracking.

Under water pressure, applied internally, pipe to sustain pressure of 12 pounds for 15 minutes, without percolation.

Under impact, pipe to sustain blow from 18-pound iron ball falling vertically 12 inches.

Thickness of pipe in inches:

	Diameter			
	12-inch.	15-inch.	18-inch.	24-inch.
Stoneware	1	1¼	1½	2
Cement	1¼	1½	1⅝	1⅞



SEWER PIPE TESTING MACHINE, BROOKLYN, N. Y.

In addition to the above tests stoneware pipes were required to show absorption of not more than 3 per cent. as proof of vitrifaction.

Under these specifications pipes of both classes were furnished and laid in 1905 at an average bid price of $1.45 per lineal foot, including foundation plank and concrete cradle. The actual cost was considerably less than this figure, since the concrete and foundation plank were bid upon separately and the latter was not used except where the nature of the soil indicated a need of the same.

Result of Crushing Tests

A summary of all the crushing tests made to date indicates clearly that a well-burnt stoneware pipe and a carefully manufactured cement pipe of suitable age will readily withstand the test imposed. This test is believed to be of great value in ascertaining the integrity of a run of pipe, since it proves the most vital quality of a pipe, viz., its resistance to heavy external loading.

The type of machine for applying crushing loads in use to date is of interest, since on account of its low cost it can be used in many places where economy in such matters must be considered. It consists of a timber beam about 23 feet long, with a hinged joint at one end and a loaded bucket at the other. The pipe is placed about two or three feet from the hinged end and the pressure applied by loading the bucket with water or other material. The pipe is incased in a box containing sand and having openings through which the performance of the pipe under compression may be noted. A calculation of the weight applied and the several lever arms determines the crushing strain transmitted to the pipe. A more expensive and elaborate hydraulic machine is being manufactured by Riehle of Philadelphia.

It appears from the foregoing that while at various periods during the past fifty years one or the other of the two classes of pipe has been used to the exclusion of the other, the general tendency has been to place them in competition when such action appeared to be in the interest of economy. During ordinary years little criticism has been applied to the character of either pipe, but in years such as 1895 and 1905, when records of pipe-laying amounting to fifty miles have been established, there has been difficulty in obtaining cement pipe of sufficient age, and this product has suffered criticism at such times deservedly.

Cement Sewer Pipe Abroad

The fact undoubtedly remains, however, that with 450 miles of cement pipe in satisfactory service Brooklyn's practice in this direction cannot be ignored, and that in addition thereto the extensive use of cement sewer pipe in England, Germany, France, Belgium, and Australia, creates a situation which American cities, other than Brooklyn, must sooner or later take into account.

Cement concrete as an engineering material has so established itself during the past few years, under the influences of the production of very high-grade cement at reasonable prices and a clearer understanding of its proper manipulation, that it cannot be long before its use in the manufacture of sewer pipe will be general. In order that its competition with earthenware pipe may be most keen it would appear desirable, since the latter cannot be made with integral self-supporting base, that the cement pipe should be, while egg-shaped, also made with uniform walls and without integral base, and that both pipes be laid upon concrete bed-blocks or concrete cradle, and that the hub joints be superseded by the English and Continental bevel joint.

A committee appointed by the American Society for Testing Materials to prepare standard specifications and tests for sewer pipe is now at work, and it is hoped that the report of this committee, when presented and adopted, may do much toward establishing uniform practice in these matters and a proper basis of competition among pipe manufacturers.

CHICAGO HOUSE DRAIN CONTROVERSY

The specifications of the Chicago plumbing ordinance regarding house drains have been under discussion for nearly a year. It was proposed that all newly-laid house drains should be tested by a ten-foot water pressure under the supervision of the Department of Health. These provisions of the ordinance have been defeated; the test has been lowered and the responsibility for inspection has been transferred to the sewer division of the Public Works Department. The mischievous feature of this amendment does not consist so much in lowering the test, because it must be admitted that this is of a somewhat uncertain value, as in the transfer of jurisdiction. A water-tight joint, rather than an air-tight joint or one that will stand a definite pressure, is the requirement. Cement-joined pipes, even if they stand a good test when new, are likely to give way at the joint, and after a few years' use they will not stand any pressure whatever. A leak in a house drain, if it is only at the top of the pipe, so as to allow gas alone to escape, is not necessarily a dangerous thing, as sewer gas is harmless except in so far as it has a tendency to vitiate the atmosphere of a close room. The essential requirement of a house drain is that it should be constructed that it will not permit sewage to leak, either when it is newly laid or for years afterwards. To secure this object the Society of Inspectors of Plumbing and Sanitary Engineers, at their last meeting, advised that all drains under new houses and for one length outside should be of iron with lead joints. It is unfortunate that the Chicago City Council has failed to conform to the highest standards of practice as established by an organization whose object is essentially the prevention of disease through sanitation. Worse than this, the Council has transferred the inspection of drains to a department that at best is but chiefly interested in economy of construction and has, in fact, been accused of lax inspections and undue partiality to the tile interests.

SEWER SYSTEMS IN THE UNITED STATES

Total Mileage of Brick, Tile and Other Material Used in Cities Arranged in Six Classes—Cost of Maintenance and Receipts—Comparison of Statistics—Other Data

THERE is presented herewith a table showing the total mileage of sewer systems in each of six groups of cities; the mileage of brick sewers, of tile, and of other kinds (probably concrete in most cases); also the annual costs of maintenance, and the receipts, both departmental and from special assessments. Although not up to date, the data are the latest which are available from the entire country.

It is noticed that the lengths per capita increase as the cities grow smaller; as would be natural, since the density of population decreases. But the difference, if we exclude the six largest cities, is not very considerable, varying from 0.947 miles per 1,000 population to 1.140, a difference of about 20 per cent.

That our cities are being more and more completely sewered is suggested by the fact that in each class the per capita length increased during the year 1902-3. The importance of sewerage work to engineers and contractors is indicated by the fact that over 700 miles of sewer were built during that year.

If we compare the lengths per capita of brick sewers (which may be considered to include most of the larger ones, and only these) with the total lengths (omitting the unclassified sewers from the totals), we find the ratios of brick to total to be 55 per cent. in the first class; 38 per cent. in the second; 35 per cent. in the third; 28 per cent. in the fourth; 21 per cent. in the fifth, and 14 per cent. in the sixth. It is probable that this decrease in ratio is due to two causes, viz., that the smaller cities require smaller trunk sewers, and that in those cities the separate system is the more common, while in the larger and older cities the combined system predominates.

That the larger cities are spending more money per mile of sewer on maintenance than are the smaller is noticeable. The administration and engineering expenses per mile in 1903 were $56 in cities of the first class; $67 in the second; $10 in the third; $11 in the fourth; $13 in the fifth, and $5 in the sixth. That this difference is not largely due to the construction of new sewers is apparent, since the ratios of increase in sewer lengths were 2.7 per cent., 5.5 per cent., 4.1 per cent., 4.1 per cent., and 4.2 per cent., respectively (the sixth class is not given because the increase noted was largely due to the addition of new cites to the list).

Comparison can be made of the statistics of any given city with the average for its class in this table, to learn its relative extent of sewer system, rate of growth, and annual expenditure.

STATISTICS CONCERNING SEWER SYSTEMS IN THE UNITED STATES, IN ALL CITIES HAVING A POPULATION OF OVER 25,000.

POPULATION	More than 1,000,000, 1st Class		From 500,000 to 1,000,000, 2d Class		From 300,000 to 500,000, 3d Class		From 100,000 to 300,000, 4th Class		From 50,000 to 100,000, 5th Class		From 25,000 to 50,000, 6th Class	
	For the year 1902	1903	For the year 1902	1903	For the year 1902	1903	For the year 1902	1903	For the year 1902	1903	For the year 1902	1903
Number of cities*	3	3	3	3	8	8	25	25	43	43	78	93
Total population	6,781,648	6,957,735	1,707,169	1,738,210	2,695,992	2,753,518	3,823,131	3,923,346	2,963,596	3,032,251	2,756,925	3,227,029
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Length of all sewers, total	3,947.1	4,059.4	1,147.9	1,215.4	2,500.3	2,607.6	3,853.4	4,018.0	2,956.2	3,085.7	2,959.6	3,678.7
Length of all sewers, per 1,000 population	.582	.583	.672	.699	.927	.947	1.008	1.024	.998	1.018	1.074	1.140
Length of brick sewers, total	1,369.7	1,399.7	453.1	463.5	879.8	903.1	1,104.4	1,130.2	642.4	656.2	467.2	520.5
Length of brick sewers, per 1,000 population	.202	.201	.265	.267	.326	.328	.289	.288	.217	.217	.169	.161
Length of tile sewers, total	1,110.4	1,142.5	660.3	716.6	1,429.5	1,503.6	2,601.9	2,739.4	2,018.7	2,123.1	2,299.8	2,848.8
Length of tile sewers, per 1,000 population	.164	.164	.393	.412	.530	.546	.681	.698	.681	.700	.834	.883
Length of other sewers, total			34.5	35.3	191.	200.9	147.3	148.4	109.2	114.7	68.9	163.4
Length of other sewers, per 1,000 population			.020	.020	.071	.073	.038	.038	.037	.038	.025	.051
Length not classified, total	1,467.0†	1,517.2†							185.9	191.7	123.7	146.
									0.063	0.063	0.045	0.045
ANNUAL EXPENSES FOR SEWERS AND SEWAGE DISPOSAL												
Administration and Engineering:												
Salaries and wages		$206,850		$62,051		$23,322		$37,701		$32,114		$18,101
All other expenses		22,643		19,920		3,276		8,436		7,820		
Other expenses:												
Salaries and wages		733,841		143,019		210,418		429,742		215,915		196,976
All other expenses		341,791		203,169		119,522		277,006		170,405		146,161
ANNUAL RECEIPTS SEWERS AND SEWAGE DISPOSAL												
Departmental		129,578		89,855		81,519		51,011		63,374		102,699
From special assessments		373,594		934,094		622,463		1,414,645		762,785		621,914

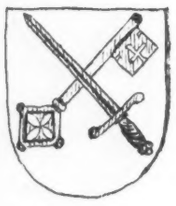
* The cities are classified according to their estimated populations on June 1st, 1903; except that those having from 25,000 to 50,000 are increased in number in 1903 by fifteen cities which had advanced over the 25,000 mark since June, 1902.

† New York's sewers, which were not classified in the reports.

A GERMAN SEWAGE DISPOSAL PLANT

Naumburg on Saale a Progressive City, with Modern Sanitary Safeguards—Description of Works—Water Purification Also—Small Area and Cost

By WM. H. SCHLADITZ, Mechanical and Sanitary Engineer



SITUATED at the well-known railroad junction, Bebra-Halle, Naumburg-Artern and Naumburg-Deuben, overlooking a fertile plain and made noticeable miles away by its magnificent old castle, is Naumburg on the Saale, a patriarch among German towns and cities.

In the sixteenth century, the seat of a powerful archbishop with his courtiers and iron-clad soldiers and well known in history as a gathering place of clerical and political potentates, Naumburg is a typical old European town, where buildings hundreds and hundreds of years old are mingled with modern structures, showing that the town has not stood still and, although proud of her majestic age, has progressed with the times.

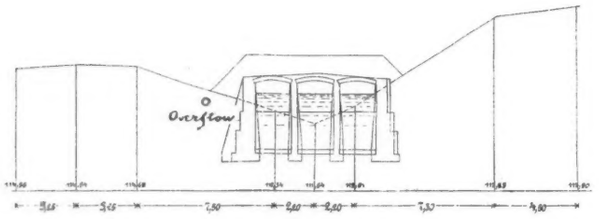


FIG. 1—SECTION A B THROUGH SEPTIC TANKS. (SEE FIG. 3.)

NAUMBURG A PROGRESSIVE CITY

Naumburg of to-day has about 25,000 inhabitants, is a lively business town, having large comb, ebony, drygoods, brush, champagne, vinegar, leather, playing cards and other industries, and also large breweries. A large trade is done in wine. The town has also a high Court of Appeals, high schools, hospitals, and a garrison of several regiments, various arms of the service being represented, as Light Artillery and the Engineer Corps. The Corps of Engineers do a great part of their drilling and practicing in, on and about the river Saale, throwing pontoon and other bridges across; they and also the other troops bathe and are taught swimming in the same river.

Owing to the pollution of the stream by the city sewage, the military Government threatened to transfer the garrison, which would have occasioned a financial loss to the city, as well as a loss of prestige due to the presence of the garrison. This led to the first steps towards the installation of a sewage disposal and purification plant; the plans were begun in the spring of 1904; the execution of the final plans started about one year later, and the works were put in operation on July 24, 1905.

The natural location of Naumburg required the division of the sewer district into two independent parts—Naumburg East and Naumburg West. The Saale flows from east to west, and the military barracks and the main business district being located in the eastern sewer district, draining into the upper Saale, it was decided to build first the sewage disposal plant for Naumburg East, with the results that the pollution of the Saale river all along the city was checked, the western sewer district draining below the city.

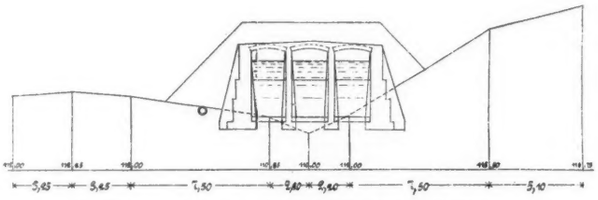


FIG. 2—SECTION C D THROUGH SEPTIC TANKS. (SEE FIG. 3.)

SEPTIC TANKS AND FILTERS

The F. W. Dittler Company, of Berlin, secured, among many bidders, the contract for the execution of this plant, having embodied in their plans the most modern and efficient methods for the purification of the Naumburg sewage, *i.e., septic tanks* for the sedimentation and liquefaction of the raw sewage, and *percolating* or *bacterial filters* for the subsequent oxidation and purification. This method has lately come very much to the fore abroad, and also in this country, the best proof being the adoption of a similar system for the purification of the Columbus (Ohio) sewage after one year of careful and thorough investigation and experiments in the sewage testing station there with 45 different designs and methods.

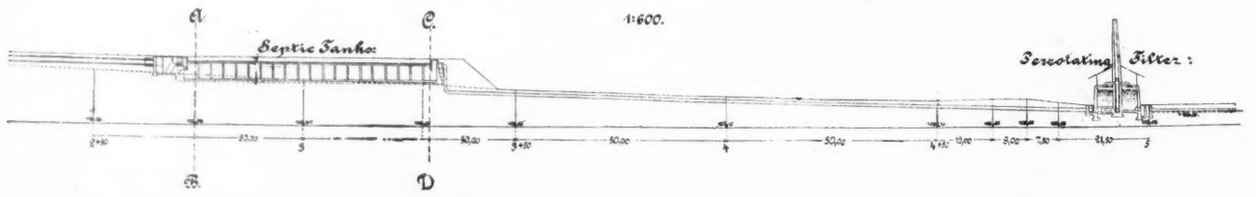


FIG. 3—LONGITUDINAL SECTION THROUGH ENTIRE PLANT.

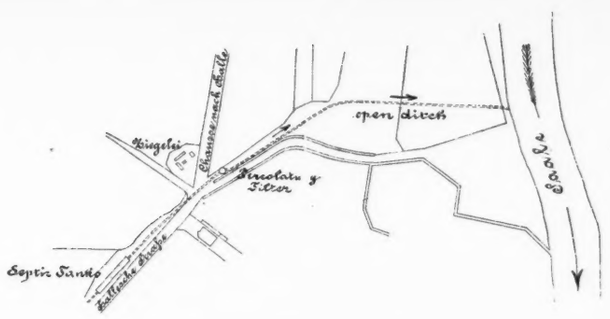


FIG. 4—GENERAL PLAN.

Naumburg East has a population of about 6,000, and as the city is growing rapidly, the sewage works were designed for a population of 10,000, with a dry weather flow of 60 liter (equal to about 20 gallons) per day per capita, or about 200,000 gallons daily flow. As mentioned above, the sewage of Naumburg East was let directly into the Saale, by means of a 36-inch main sewer, which conveyed the sewage to the present location of the septic tanks (see general plan), from where is an open ditch connected with the Saale. The location of the septic tank was thus determined right from the beginning.

Grit Chamber—(Marked Z, see Sheet No. 2).—The usual grit chamber precedes the septic tanks to protect the same from pieces of wood, tin cans, etc., which happen to enter the sewers, or sand which is carried along with the rain water.

Septic Tanks—Owing to the concentration of the Naumburg sewage (as well as the German sewage in general, as the use of water closets is not as fully introduced as in England and in this country), the septic tanks are comparatively large. They are 196.8 feet long in all, are three feet wide over all, and 12.29 feet high over all. There are three compartments—M. N, O (see Fig. No. 6)—each being 196.8 feet long over all, 6.58 feet wide (inside), and 12.39 feet high; high water mark, 9.84 feet. The outside walls are 3.28 feet at the bottom and 2 feet at the top. The long partition walls have an average thickness of one foot and buttresses at every 6.58 feet. The end wall of the septic tanks is 2.5 feet thick. The structure is built partly of concrete and partly of brick masonry.

The sewage enters first the grit chamber Z, then travels through tank M, enters at Q tank N, travels through N and enters at R into tank O, until it leaves the septic tanks and enters the cast-iron pipe P. At Q, R and B are curtain walls and weirs, thus preventing any solid parts of the top and bottom scum of one tank to be flushed over to the next.

The septic tanks are covered by concrete vaults (see Figs. Nos. 8-9, section E. F. and G. H.), the top of which is three feet below surface line. Sufficient manholes are provided for ready access.

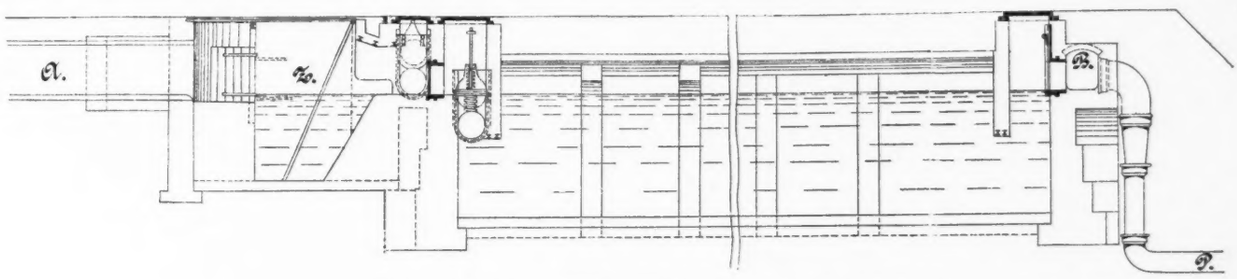


FIG. 5—SECTION A B C D THROUGH GRIT CHAMBER AND SEPTIC TANKS.

The tanks M, N and O can be used independently, six valves permitting the separation of any of the tanks for repairs, cleaning, etc., without any interruption of the working of the entire plant.

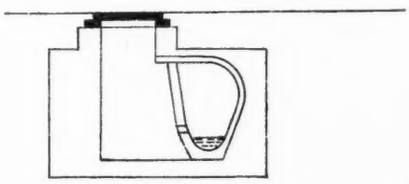


FIG. 7—SECTION J K THROUGH GRIT CHAMBER. (SEE FIG. 6.)

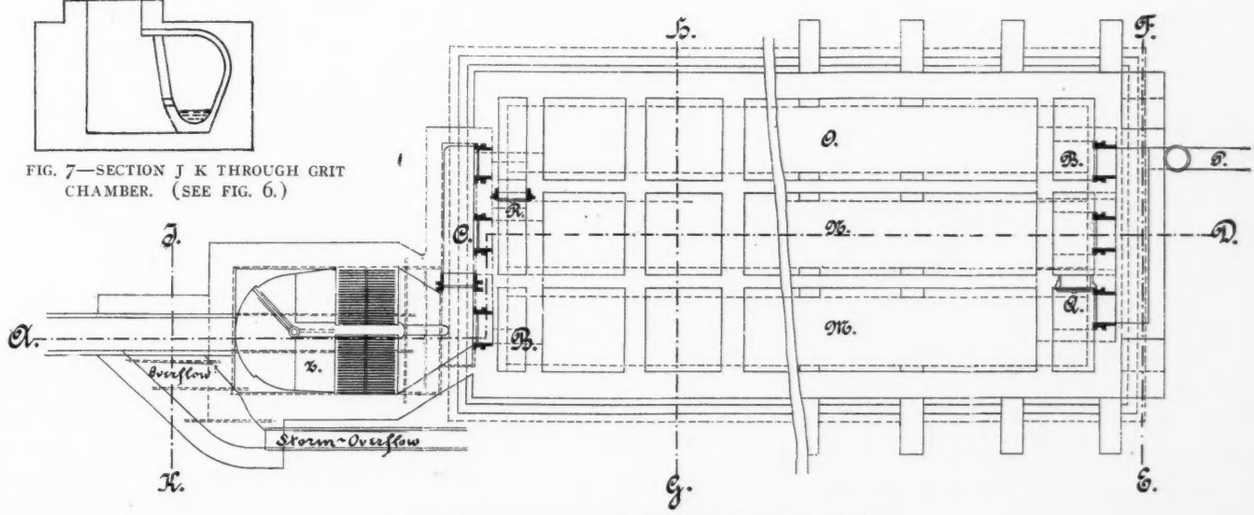


FIG. 6—PLAN OF GRIT CHAMBER AND SEPTIC TANKS.

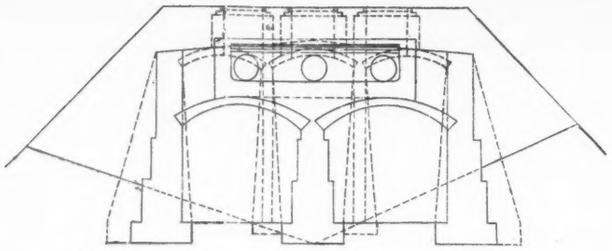


FIG. 8—SECTION E F THROUGH SEPTIC TANKS. (SEE FIG. 6.)

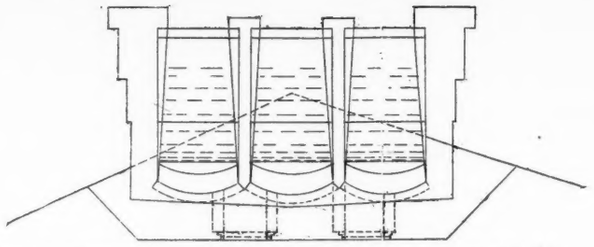


FIG. 9—SECTION G H THROUGH SEPTIC TANKS. (SEE FIG. 6.)

Percolating or Bacterial Filters—(Coke-Tower)—After the sewage has traveled through the three septic tanks, as described above, and assumed a thoroughly liquefied and septic character, it enters at P (see Fig. No. 6) an 18-inch cast-iron pipe line and is pressed by natural gravitation into the sprinkler system on top of the percolating filter, which is built at a distance of about 600 feet from the tanks.

To make a successful use of the natural fall, and to avoid an expensive pumping plant and reduce the cost of maintenance to a minimum, the septic tanks and percolating filters had to be separated.

The liquefied sewage enters the coke tower through a cast-iron pipe in the center of the tower, which supplies six revolving sprinklers (especially designed for this purpose by the Dittler Company). These sprinklers distribute the sewage carefully and equally over the whole area of the filter.

The Coke Tower

The coke tower is built of brick masonry, is 19.68 feet high, round and 32.80 feet in diameter. The average thickness of the outside walls is two feet. The oxidation material is a high-grade blast furnace coke, crushed to different sizes, having a finer layer on the top and coarser material on the bottom.

To secure perfect ventilation and to draw off any developing gases a ventilation system is provided, a draught stack of brick masonry 65.6 feet high furnishing the necessary draught.

The coke tower is covered with a wrought-iron construction. The volume of the coke tower is 4,500 Hectoliter, which equals about 120,000 gallons, or 12,000 bushels, or about 250 tons of coke.

Effluent—The effluent is colorless and odorless, and of such a character that it can be discharged into the Saale without polluting the water, for which purpose an open ditch is used—(see general plan). In case of an epidemic a disinfection chamber is provided (see Fig. No. 10 coke tower). By-passes and storm overflow are also arranged for both the septic tank (Fig. No. 6, plan) and coke tower (Figs. No. 10 and 11).

The whole system works automatically; the only supervision and manual labor required is that of the daily cleaning of the grit chamber, which ought to take one man not more than one-half hour every morning and night. An annual thorough inspection of all parts of the entire system is advisable.

The entire plant is of such a design that it can be increased in size at any time to any amount of sewage which might be treated by adding another or more septic tanks and another or more percolating filters.

Report of Expert—Prof. Dr. Vogel of Berlin, an expert in all matters regarding sewage disposal and water purification, reported on the Naumburg Disposal Works on the 12th of October, 1905, *i.e.*, about three months after the works were put into operation.

Prof. Dr. Vogel says, at the end of his report, "I find that the Sewage Disposal Works for Naumburg East as constructed by the F. W. Dittler Company, Berlin, to be perfectly efficient and of such a design as to insure perfectly satisfactory results.

Construction Data

A.—Septic Tanks

1,932.00	c.b.m. of earth excavation at M. 1.00	M. 1,932.00	
524.70	c.b.m. of concrete at M. 18.00	9,444.60	
	Manholes, piping, reinforcement, valves, etc.	3,647.52	
		M. 23,060.52	=$5,765.15

B.—18" Pipe Connection of Septic Tanks with Percolating Filter

1,200.00	Kilo castings at M. 25.00	M. 300.00	
175.00	Meter 18" cast-iron pipe, laid, at M. 25.00	4,375.00	
		M. 4,675.00	=$1,168.75

C.—Percolating or Sectional Filters

335.51	c.b.m. of earth excavation at M. 1.00	M. 335.51	
176.95	c.b.m. of concrete for foundation, etc., at M. 18.00	3,185.10	
86.56	c.b.m. brick masonry at M. 24.00	2,077.44	
401.04	c.b.m. cement finish at M. 1.75	701.82	
41.89	c.b.m. brick masonry for draughtsmen at M 40.00	1,675.60	
	Asphalting	339.12	
	Roof construction	3,000.00	
	Sprinkler system	1,200.00	
	Miscellaneous	2,522.80	
		M. 15,037.39	=$3,759.35

Recapitulation

A.	Septic Tanks	23,060.52	
B.	Pipe connection, Septic Tank or Perc. Filter	4,675.00	
C.	Percolating Filter	15,037.39	
D.	Engineering, plans, specification, supervision, traveling expenses, etc.	7,226.89	1,806.75
		M. 50,000.00	=$12,500.00

A Successful Plant

This plant for the City of Naumburg is a particularly successful example of modern up-to-date sewage disposal works, embodying:

a. Small area.
b. Small cost of construction.
c. Small cost of maintenance.
d. Efficiency in operation.

The cost of the complete installation was $12,500, or about $2.50 per capita, which is little, considering the fact that the plant is entirely automatic in operation and the only expenses incurred in maintenance are those in connection with removal of grit, etc., from the grit chamber, which amounts to about $240 a year, or two and a half cents per capita.

Numerous analyses have shown a uniformly satisfactory effluent from the plant at Naumburg East, regardless of the season of the year, and in general the results fully justify the action of the Municipal Board in requesting the F. W. Dittler Company to prepare plans and estimates for a similar plant for Naumburg West.

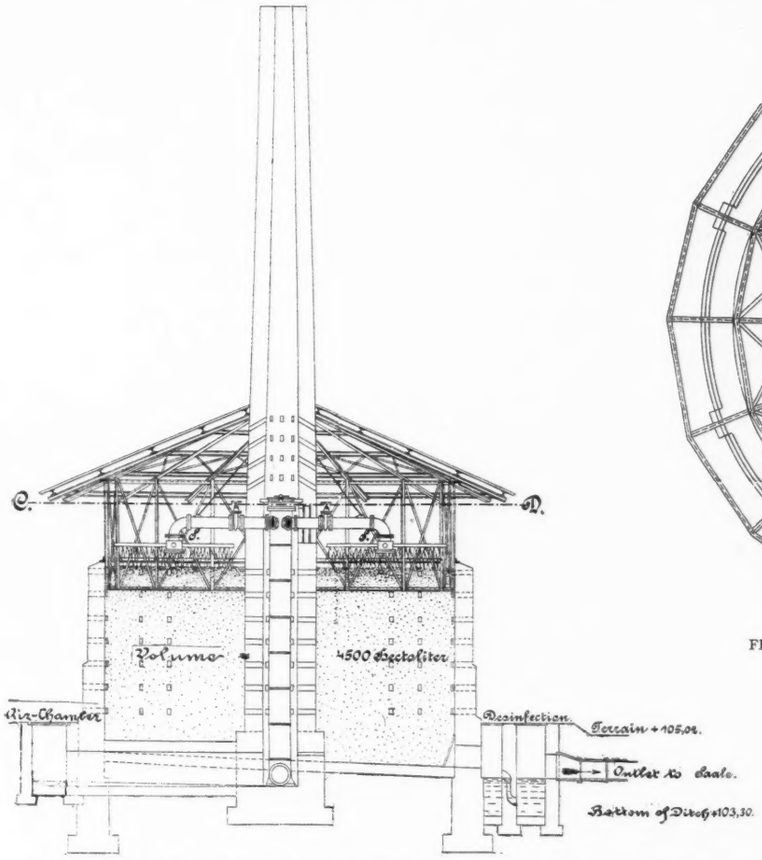


FIG. 10—SECTIONAL ELEVATION A B OF PERCOLATING FILTER. (SEE FIG. 11.)

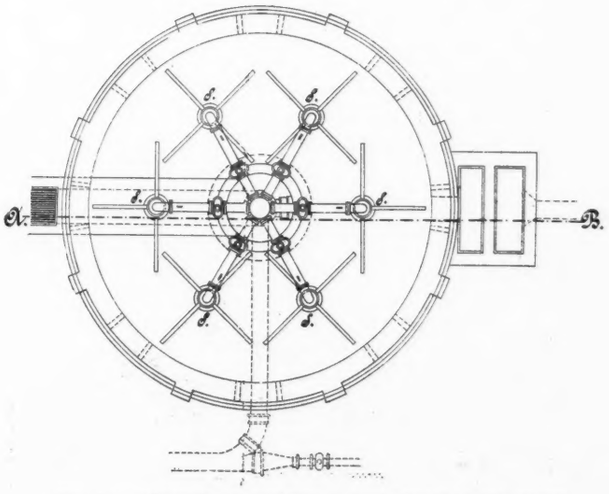


FIG. 11—HORIZONTAL SECTION C D OF PERCOLATING FILTER. (SEE FIG. 10.)

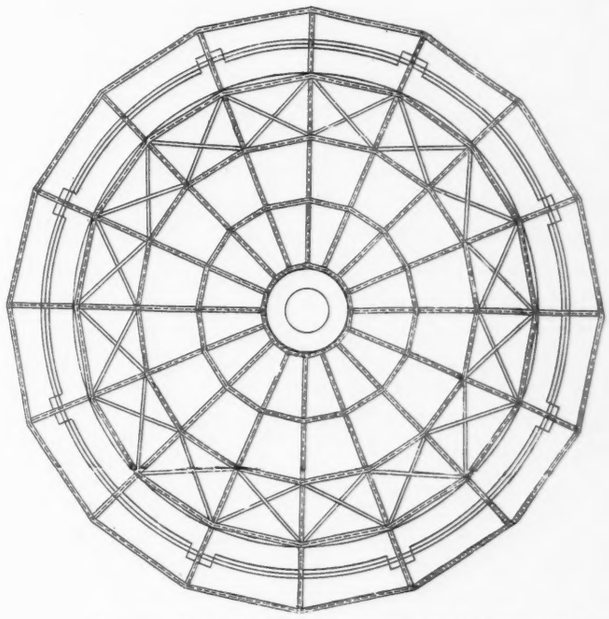


FIG. 12.—ROOF CONSTRUCTION OF PERCOLATING FILTER (COKE TOWER).

This system, although adapted to many cities for the disposal and purification of its waste waters, is also suitable for installation at country dwellings, factories, hospitals, etc. It is claimed that the system answers all purposes and furnishes a biological purification of sewage. It will be appreciated as a means of keeping the house and grounds in a healthy condition as well as a necessity for safeguarding streams from pollution. In a minimum of space and in a very short time ill-smelling refuse waters can be changed into perfectly clear and odorless liquid without any fouling or fermenting. The effluent is so harmless that there can be no objection to its discharge into any watershed; moreover, the apparatus is automatic and self-cleaning, requires no manual labor, suffers no interruption of its continuous working and admits of no disarrangement of its parts.

The American Dittler Sewage Disposal Co., 1123 Broadway, New York, controls the patents in the United States and is closely affiliated with the parent company.

SEWAGE PURIFICATION FOR COLUMBUS, OHIO

Final Summary and Conclusions of Extensive Investigations—Local Conditions—Preparatory Treatment and Disposal of Sludge—Various Processes of Filtration Tested

By GEORGE A. JOHNSON, Engineer in Charge of Testing Station

The Problem

Columbus, Ohio, is located on the upper portion of the watershed of the Scioto River, which is joined within the city by the Olentangy river. The upper Scioto river has a drainage area of 1,053 square miles and the Olentangy river 612 square miles. From Columbus to the mouth of the Scioto river the distance by water is roughly 100 miles, and as the stream flows through this distance its waters are in no instance used for domestic purposes and used but little for manufacturing. From the mouth of the Scioto river at Portsmouth there are practically no water supplies taken from the Ohio river for a distance of 100 miles, until there is reached the city of Cincinnati, Ohio, and the adjoining cities of Covington and Newport, Kentucky. The ordinary flow of the Scioto river below Columbus is from about 30 to 50 cubic feet per second, and during very dry weather, opposite and just below the city, it is often putrescent, unsightly and foul-smelling. Thus it is seen that for an inland city the problem of sewage disposal at Columbus is, to rather an unusual degree, one of eliminating nuisances in the immediate vicinity of the city rather than effecting a degree of purification from the standpoint of the pollution of the water supplies of nearby cities.

The Columbus Sewage

The Columbus sewage from a system of combined sewers receiving certain amounts of storm water was tested with unusual thoroughness. Fifteen thousand two hundred and twenty-eight (15,228) portions of the sewage were collected for chemical and bacterial analyses. This sewage is representative of the main sewerage district of the city, where about 75,000 people are connected with the sewers. The average flow of the sewage to which these data refer was about 9,000,000 gallons daily.

The analyses show that on an average the per capita composition of the Columbus sewage is much stronger than that of cities having separate sewers; and further, that it is much weaker than the sewage of those cities, such as certain cities in Massachusetts, and Manchester and Leeds in England, where numerous manufacturing wastes are discharged into the public sewers. When compared with the records from other cities, the per capita constituents of the local sewage resemble most closely those of London, England. On an average the sewage, as tested, corresponds to a per capita flow of about 120 gallons daily. This dilution shows a rather stronger sewage than found in some other American cities, but it is less than half as strong as that of many European cities.

Unusual attention was paid to determining the amount of suspended matter, or sludge, in the Columbus sewage. Briefly stated it was found that the suspended matter in the local sewage averaged as follows:

Parts per million	215.
Grams per capita daily	98.
Tons of dry suspended solids per million gallons	0.9
Tons of dry suspended solids per 1,000 population per annum	39.5

At the Columbus Sewage Testing Station about 350,000 gallons of sewage were treated daily in a series of devices comprising 10 tanks or filters for preparatory treatments, and 31 filters in which the sewage was given its final treatment.

Preparatory Treatments

By preparatory treatment is meant those procedures by which there are removed the suspended matters of the sewage with as much thoroughness as economy allows on a practical scale. They involve screening, the use of grit chambers, plain sedimentation tanks, septic tanks, chemical precipitation tanks and coke strainers. The coke strainers were simply rough filters or strainers of coke, while the other processes involved sedimentation in

THE COLUMBUS TESTING STATION, LOOKING SOUTH.

tanks of various relative sizes corresponding to periods of flow ranging from about one-half hour to twenty-four hours.

Briefly stated, it was found that of the suspended matter in the raw sewage, about 50 to 60 parts per million were so very fine that it is not feasible to remove them by any of these processes. Hence these fine particles remained for treatment in the finishing processes and were not a factor in these preparatory treatments involving sedimentation.

Screening allowed about 36 parts per million of coarse matters to be removed, corresponding to 0.17 cubic yard per million gallons. All the sewage tested at this station was first screened.

Grit chambers were not successful under the local conditions because in the sewage after screening there did not remain sufficient coarse particles of a mineral nature to allow sedimentation in small grit chambers to yield a sludge differing materially from that in the ordinary sedimentation tanks.

As to *plain sedimentation* it was found that about 130 parts per million, or about 65 per cent., of the suspended matter in the screened sewage could be deposited in sedimentation tanks holding an average flow of some four hours. Increase in the period of sedimentation beyond about four hours did not produce in a practical way much effect upon the remaining particles of suspended matter. Similarly it was found that a reduction in lineal velocity below about 4 mm. per second (48 feet per hour) for a period of about four hours did not affect appreciably the removal of the suspended particles.

The treatment of the sewage by means of sedimentation to the extent above stated caused a production of sludge or solid matter upon the floor of the sedimentation tanks to the extent of about 0.65 ton of dry solids per million gallons. This sludge contained a somewhat varying percentage of water, which averaged about 87 per cent. This makes the volume of sludge deposited by plain sedimentation tanks about 5.75 cubic yards per million gallons.

Chemical precipitation with the use of both lime and copperas and of sulphate of alumina was tested in sedimentation tanks having an average period of flow of eight hours. It was found that while the coagulants caused the coarser matters to be precipitated more quickly than in the case of plain sedimentation, the fine particles could be removed to a further extent only with much difficulty and expense for the precipitating chemicals. The volume of sludge is so much greater than in the case of plain sedimentation that it can be clearly stated that on the grounds of cost alone chemical precipitation is not applicable to the local sewage problem.

Septic treatment and plain sedimentation are substantially the same in their initial step, which, briefly stated, consists of the deposition of about two-thirds of the total matters suspended in the Columbus sewage. Further, both effect a substantial mixing of the sewage, so that there is obtained an effluent of fairly uniform composition. The two treatments differ in that the plain sedimentation tanks require to be cleaned out every one or two weeks when the accumulating sludge on the bottom of the tanks begins to putrefy and to cause ebullition of gas; whereas in the septic tanks this putrefaction and gasification of the sludge is allowed to continue for many months at a time. The septic tanks tried at this station were of various sizes, so that the average period of flow ranged in different cases from four to twenty-four hours. In brief, it was found that the septic tanks, holding on an average about eight hours' flow, allowed this process to continue as far as it was advantageous to do on a practical scale. That is to say, septic tanks of an 8-hour capacity provide sufficient space for the accumulation of sludge so that the putrefactive agencies characteristic of the process may liquefy and gasify as much of the solid sludge as can be disposed of in this way. It was found that on an average fully 50 per cent. of the deposited sludge in the raw (screened) Columbus sewage can be thus liquefied and gasified by the septic treatment. It was found that there would be required a sludge disposal of not more than 2.68 cubic yards per million gallons with the septic treatment, as compared with 5.75 cubic yards with plain sedimentation.

It was further found that septic tanks holding an average flow of twenty-four hours neither materially increased the amount of sludge septicized, nor did they cause the liquid leaving the tank to be over-septicized or of such a composition that it was with difficulty treated by subsequent filtration. No offensive odor was noticeable around the septic tanks, and the deposited septic sludge when finally removed was remarkably free from offensive odor.

One of the *coke strainers,* on an average, caused a removal of about 81 per cent. of the suspended matters of the applied sewage, and thus was rather more successful in regard to clarification than any of the other preparatory treatments. The other coke strainer, however, showed an average removal of suspended matter of only 64 per cent. The coke strainers were considered to be hardly suited for adoption on a large scale at Columbus, owing to their irregular behavior and to the expense attending the removal of about 5.5 cubic yards per million gallons of clogged coke which would no longer serve its purpose as a straining medium. The strainers would also be difficult to use in practice during freezing weather at rates exceeding about 1,500,000 gallons per acre daily unless they were placed under cover, which would, of course, add greatly to their expense. The removal of fats from the crude sewage by the coke strainers was about 77 per cent.; that removed by sedimentation tanks averaged only about 53 per cent.

Sludge Disposal

As to the question of final disposal of the sludge from preparatory treatments involving sedimentation, it is, of course, perfectly feasible to dispose of the sludge from all of the processes upon land adjoining the purification works, as is done in many of the large European cities. In regard to the sludge from the septic process it has the advantage of being not only far less in quantity than that of the other processes, but possesses several other

distinct advantages in regard to its disposal. They refer particularly to the question of disposing of a portion or all of the septic sludge into the Scioto river at times of flood flows.

The advantages of the septic process are shown, first in that this is the only one of the processes in which the sludge can be satisfactorily allowed to accumulate within the purification works themselves so that it can be disposed of only during floods in the river. This means that in practice the septic tanks should be of such a size that the sludge can be readily allowed to accumulate in the tanks for eight months or more, or from the high-water stages of the early spring until rains again produce high water late in the following autumn or winter. The septic process possesses a second distinct advantage in that the storage of the sludge for such long periods as those just mentioned causes a dying out of a large number of disease germs. Hygienically this advantage is an important one and is possessed by no other process involving sedimentation.

Under conditions at many places this method of disposal of septic sludge would not be feasible, but here at Columbus the local conditions are such that each volume of septic sludge can be disposed of in the waters of the Scioto river by dilution with 800 volumes of river water. This dilution is so great that the amount of organic matter and other constituents in the river water below the purification works and coming from the Columbus sewage would then be less even than in the case of the river water at this place during low stages, when it is receiving only the settled effluent of the final filters. Another important aspect of the disposal by dilution of septic sludge is that owing to the death of a very large percentage of all of the disease germs contained in it, it is a safer and more hygienic procedure than is the discharge during storms of portions of the flows in the sewers which contain, of course, considerable numbers of virulent disease germs.

Filtration Processes

The several finishing processes by which the desired degree of purification might be secured of the sewage after receiving preparatory treatment comprised intermittent sand filters, which were recommended for local adoption by Mr. Hering in 1901; contact filters, which were earlier recommended by Messrs. Griggs and Alvord, and sprinkling filters, which, with much success, have been recently used in Europe, but which on a large scale have not yet been used in the northern part of this country and in no case where the winter weather is as cold as it is apt to be in our Middle West and Northwest.

Intermittent sand filters comprise areas three to five feet in depth of porous sand, such as is locally used for building purposes, and which, in the case of Columbus, would have to be brought from the shores of Lake Erie. A daily dose of sewage to the extent of about four to twelve inches is applied to them. The sand is allowed to drain and the pores to fill with air during the intervals between doses.

Contact filters comprise areas of broken stone or coke of a size ranging ordinarily from about 0.25 inch to 2.00 inches, and about three to five feet in depth. These filters are operated by filling the pores with sewage and then allowing the contents after a short period slowly to drain out. This filling and draining comprises one complete cycle, which as a whole is carried out from one to three times each day, as circumstances prove advisable.

Sprinkling filters comprise three to five foot depths of broken stone or coke of a size from about 0.50 inch to 2.00 inches or thereabouts, and ordinarily somewhat coarser than the material in contact filters. Like all coarse-grain filters they require to be well underdrained. The sewage is applied to them in the form of a spray, which is uniformly distributed over the surface either from revolving sprinklers or stationary jets. The latter were used at Columbus.

One of the most important features learned during these tests was that sprinkling filters properly designed could be operated in this northern climate during severest winter weather without any freezing of the sewage at the sprinkling nozzles. During prolonged zero weather some ice does, of course, accumulate on the filter surface, but the experiments have indicated that, with careful management, such weather in Columbus would not seriously interfere with the practical operation of the plant.

The behavior of the different styles of filters varied somewhat according to the thoroughness with which suspended matters were removed by the preparatory treatment given to the sewage applied to them. For this reason it is well briefly to summarize the results obtained.

Sand Filters

After the local sewage has been screened and has had about one-quarter of the suspended matter removed from it in the grit chamber, the sand filters can purify it very thoroughly at a rate of about 100,000 gallons per acre daily. The filtered sewage would be clear and the removal of organic matter and bacteria about 90 and 98 per cent., respectively.

With the effluent of the plain sedimentation tanks in which about two-thirds of the suspended matter of the raw sewage is removed, sand filters can operate at a rate of some 250,000 to 300,000 gallons per acre daily and produce an effluent of the character just stated.

Coke strainers in which are removed about 75 per cent. of the suspended matter in the raw (screened) sewage, allow sand filters to produce an effluent of the character stated when operated at perhaps somewhat higher rates than those last referred to.

As to the cost of operation of intermittent sand filters, the local tests were of too short duration to do other than to indicate a general harmony with experiences elsewhere on a large scale where the costs vary somewhat, but average more than 20 cents per annum for each person connected with the sewers.

Where the effluents of septic tanks were applied to intermittent sand filters, it was found that the results ap-

proached, but did not fully equal, those obtained in conjunction with plain sedimentation. The reason was that the gas ebullition at intervals caused portions of the fine sludge to be removed from the bottom of the septic tanks and to be deposited on the surface of the sand filters. This caused more or less clogging, which would be quite a serious factor in practice unless special efforts were successfully made to keep this septic sludge from reaching the sand surfaces.

Sand filters receiving the effluents of chemical precipitation tanks holding an average flow of about eight hours suffered materially from the chemicals used in precipitating the sewage and which were not removed entirely by sedimentation. Experience elsewhere with muddy river waters of the Central West indicates that the sedimentation basins should have a capacity of at least 24 hours. The process is less economical than others to warrant consideration locally, and the tests upon it were abandoned early in the investigations.

Contact Filters

The effluent of the septic tanks was found to be just as capable of treatment in contact filters as in the case of unsepticized settled sewage. Every effort was made to operate these filters so that they would produce an effluent which would not putrefy and at as high a rate as this requirement would permit. With filters five feet in depth it was found that with an average rate of about 1,000,000 gallons per acre daily it was hardly feasible to obtain a satisfactory effluent regularly. Double contact treatment appeared to have some advantages over single treatment. Satisfactory results as a regular procedure on a large scale could hardly be obtained at net rates materially exceeding about 600,000 to 700,000 gallons per acre daily. In this regard contact filters were distinctly inferior to sprinkling filters.

Sprinkling Filters

With the sewage distributed from stationary nozzles over filters of broken stone five feet in depth, the head of sewage on which was about four feet, it was found perfectly feasible to obtain a non-putrescible effluent at an average net rate of about 2,000,000 gallons per acre daily, and moreover no difficulty was experienced in operating these nozzles under severe winter conditions. The septic effluent behaved as well as that obtained from plain sedimentation tanks, but no better. Although odors were perceptible near the sprinkling nozzles, it is not thought that such odors will be noticeable at a distance of over one-quarter of a mile from the main works when built. While the effluent was non-putrescible it contained more or less turbidity, part of which was due to the extremely fine submicroscopic particles in the original sewage, while a part was composed of fairly large particles detached at irregular intervals from the filtering material and around which they had been present as films. It was found desirable to remove by sedimentation the larger of these particles contained in sprinkling filter effluents. This was readily done in small settling basins holding an average flow of about one hour. The volume of this sediment, containing about 90 per cent. of water, would average annually about one cubic yard per million gallons.

The Process Recommended

Without going into further detail of these several processes, it may be said that the data conclusively show the best method for adoption under local conditions to be as follows:

1.—Preliminary clarification of the sewage in basins holding on an average about an 8-hour flow and operated on the basis of the septic treatment.

2.—Purification of the septic effluent to a non-putrescible state by sprinkling filters at an average net rate of 2,000,000 gallons per acre daily.

3.—Final clarification of the effluent of the sprinkling filters in basins holding an average flow of about two hours.

This process produces a *non-putrescible* effluent of satisfactory appearance and from which about 90 per cent. of the bacteria in the raw sewage are removed.

SEWERS AND AUTOMOBILES

A few decades ago, before the pathogenic germ had become a prominent recipient of public obliquy, "sewer gas" was receiving considerable attention from sanitarians and the public, but there now remains but a trace of the feeling that sewer gas is a deadly something whose malignity may take almost any form, from conveying smallpox to violently exploding. In fact, even Municipal Engineers and Superintendents of Sewers are too apt to neglect any precautions against the recognized dangers from sewer contents. Among these, one of the most common is the leakage into sewers of illuminating gas, with the occasional resultant explosions or asphyxiation of workmen who descend into the manholes. A new source of danger is thought to have made itself known by causing, on four occasions, violent explosions in the sewers of the section of New York between Fiftieth and Fifty-fourth streets, Eighth and Tenth avenues, the fourth, which occurred on April 6, hurling thirty or more manhole covers into the air, some rising above the house roofs, and injuring six or more persons. This has been attributed to the existence in the sewers of the district affected of gasoline and other oils from the numerous automobile stations in that neighborhood, and this explanation certainly seems a probable one. Whether or not it is the correct one, it calls attention to a real danger and to the necessity for more regulation of the use of city sewers. It is a too common idea that anything may be discharged into a sewer which can be got into it, and gas tar, chemicals, steam, as well as ashes and other household wastes, help to clog or cause nuisances in many of our sewer systems. A properly designed and constructed sewer system will cause no nuisance and be a source of no danger if properly maintained, but to neglect and allow and encourage its use as a catch-all for unsuitable matter is a dereliction of which no Superintendent of Sewers or City Engineer should be guilty.

THE DISPOSAL OF MUNICIPAL WASTE

Systems and Methods, with Special Reference to American Conditions—Buffalo's Refuse Disposal Station—A New York City Plant—The Treatment of Ashes—Facts and Figures

By WILLIAM F. MORSE, Sanitary Engineer, New York.

This Series of articles begun in the February number, will be continued until completed and will be illustrated by original drawings, cuts, diagrams and pictures, and contain many tables valuable for reference.

The Subjects Already Treated by the Author Are:

1. The Waste Collection Service in American Towns; Methods and Results.
2. Definition of Terms; Quantities; Proportions; Character of Waste in General.
3. Garbage; Analysis; Proportions; Values.
4. Dry Refuse and Rubbish; Quantities and Treatment.
5. Classification:—Commercial Values after Recovery.
6. The Refuse Utilization Stations in New York, Boston, Buffalo, and Brooklyn (illustrated).
7. Municipal Ashes; Analysis; Proportions; Values when Separated.
8. Ashes from Cremation of Garbage; Analysis and Values; Comparative Table.
9. Comparison of aches from English and American Cities; Cremation Means.

The Following Are to Appear:

10. The Utilization of Municipal Waste in General; English and American Methods.
11. Commercial Values of Refuse and Ashes when Marketed and Manufactured.
12. The Analysis of Garbage; Tankage, Its Value (Special Tables).
13. The Garbage Disposal Plant, Cleveland, Ohio.
14. Street Sweepings; Fertilizing Value and Treatment.
15. The Disposal of Mixed Municipal Waste; Means and Cost.
16. Methods of Disposal; Cremation.
17. Beginning and Progress.
18. Apparatus and Furnaces; Record of Work (Illustrated).
19. Apparatus and Furnaces; Record of Work; Results.
20. Types of Furnaces; Their Employment; Municipal, Institutional, Industrial, Medical, Laboratory (fully illustrated).
21. Calorific Value of Waste as Fuel (comparative table).
22. Reduction and Extraction Process Described and Illustrated; the Earlier and Later Methods.
23. Foreign Destructors; Special Chapter by an Eminent Authority.
24. American Methods; Col. Waring and His Successors.
25. Present Situation in This Country; Résumé.
26. Means for Improvement as Suggested by Several Investigators.
27. What May Be Expected of the Future.

THE REFUSE DISPOSAL STATION IN BUFFALO

IN 1903 the city of Buffalo had under consideration a plan for the reorganization of its service for the collection and disposal of waste; also for the disposal of sewage from a large district of the city that was below the level of the main sewerage system. An examination made by the Commissioner of Public Works, Col. Francis G. Ward, of several plans and methods, decided him to accept the designs of Mr. C. M. Morse, Deputy Engineer Commissioner, for the erection of a Combined Sewage Pumping and Refuse Disposal Plant on ground owned by the city at the Hamburg Canal.

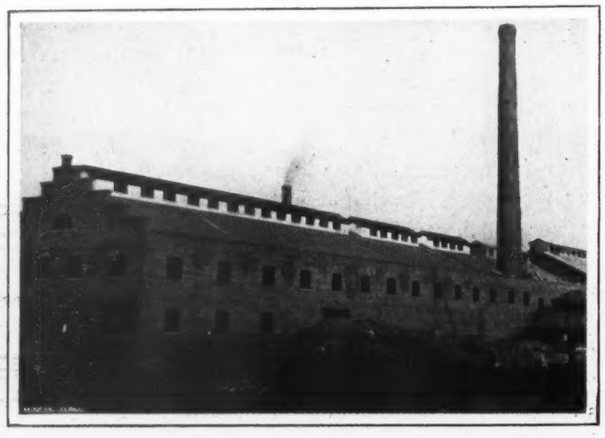


FIG. 11.—REFUSE DISPOSAL STATION, INCLUDING CHIMNEY—SEWERAGE PUMPING STATION BEYOND, BUFFALO, N. Y.

The designs and estimates of the writer were accepted for the Refuse Disposal Plant. The contract for the collection and disposal of the ashes, garbage and refuse for a term of five years, was awarded, after competition, to the Buffalo Sanitary Company, and provided for the erection of a Refuse Disposal Station adjoining the Sewage Pumping Station, which was completed in June, 1905.

The building is of brick, is 200 feet long, 50 feet wide and 25 feet high at the eaves, with a steel trussed roof. A division of the building into two parts is made by a fireproof wall; the main receiving room is 100 by 50 feet, and affords ample space for dumping the four or five hundred cubic yards of refuse received daily. Beyond the fireproof wall is the destructor, separated from the adjoining sewerage pumping station by another wall, through which the flues connect from the furnace to the fire box of the steam boiler in the pumping station.

Between the receiving floor and the destructor is placed the conveyor, which carries the refuse up an incline to the floor of the sorting room, and thence sixty feet between the sorting bins.

After passing the second floor the remaining worthless rubbish passes up the inclined conveyor and is discharged through a chute into one or another of the three charging holes, as may be desired. When the works are operating this stream of combustibles is constant, no hand-firing being required.

The destructor is 33 feet long, 12 feet wide and 13 feet high. The exterior is strongly braced by buckstays and tie-rods, and by longitudinal angle bars to which the frames of all doors are bolted.

The interior construction really comprises a double furnace, with independent fire boxes and fire-brick grates for sustaining the refuse. The area of the fire boxes is 36 sq. feet, that of the refuse grates 160 sq. ft.; a total of 196 sq. ft. of grate surface. The fire boxes are separated by a bridge wall so that they may be worked independently under forced draft. Behind these iron grates are two sets of fire-brick grates one above the other, but which are divided from each other by a longitudinal bridge wall. Above the upper set of grates is the main receiving chamber of the destructor, approximately 20 feet long, 8 feet wide and 6 feet high, interior dimensions. At the rear end is a combustion chamber common to both furnaces to which all the gases are directed and from whence they are taken into the boiler placed in the Sewage Pumping Station, or direct to the chimney by a bye-pass.

At the present time a small 60-horsepower boiler is set in connection with the destructor for the purpose of elec-

tric lighting, operating the conveyor and baling presses, and for furnishing forced draft. By means of sliding dampers this boiler can be put out of commission when connection has been made with the boilers of the sewerage plant.

The combustion of refuse is accelerated by means of forced draft from a 60-inch blower, and is introduced on each side of the destructor under the ash pits of the fire boxes. The effect of this is to hasten combustion and to develop a higher temperature than can be had by operating under natural draft.

The chimney, which is connected with the boilers of the Sewerage Pumping Station and with the destructor, is 150 feet high, and was constructed by the Alphons Custodis Company of radial brick, reinforced by a lining of fire-brick to withstand the high temperature generated by the destructor.

The rooms which contain the dynamo and engine are separated from the main destructor room, and bathrooms and all other necessary conveniences have been provided for the comfort of the employees.

The whole construction has been made in a superior way, with the best materials and workmanship obtainable, and the plant is fireproof throughout. The plant was built under the superintendence of the Morse-Boulger Destructor Company of New York City. The approximate cost of the Refuse Disposal Station and all machinery, inclusive of the chimney, was $40,000.

The quantities of Refuse received at the Buffalo plant for six months are as follows:

TABLE XIV. QUANTITIES AND DISPOSITION OF REFUSE, BUFFALO

	Quantities.	*Disposition*
June, 1905	12,736	Rubbish, dirt, ashes sent to dump from station, 2,116 cubic yards.
July, "	14,599	
Sept, "	15,176	
Oct., "	15,395	Tins marketed, 452 cubic yards.
Dec., "	10,887	Iron marketed, 2 tons.
Jan., 1906	10,924	
Del. at Sta.	79,717 cu.yds.	

The amounts of refuse sorted at this Station are not available at present, but the conditions of the work are very much the same as in New York and Boston, with the exception of a larger quantity of foreign matter, such as sand, wood, tin, iron, and dirt, than is the case with the collections in other large cities.

Experiments for determining the amount of power to be obtained from the combustion of this amount of refuse are now being made under the direction of the Deputy Commissioner, and will be reported later.

DELANCEY STREET REFUSE DISPOSAL STATION, NEW YORK CITY

Following the construction of the Forty-seventh street Station, the Department of Street Cleaning caused to be erected in November, 1905, a combined Refuse Incinerator and Power Plant in Delancey street beneath the Williamsburg Bridge. The building, which contains the furnaces and boilers is a one-story structure 70 x 150 feet in area, with brick walls and a steel trussed roof. It is divided into two rooms by a fire wall in the front of which is the receiving, baling and sorting floor; at the rear end are the boilers used for steam generation.

From the sorting floor a short conveyor carries the refuse to the top of the furnaces, discharging between them, so that they may be fed by hand simultaneously. During the passage of the refuse over the conveyor the trimming contractor's men pick out a small proportion of the paper, which is baled by power presses and removed from the building. The remainder of the refuse furnishes fuel for the operation of the furnaces and the development of steam power.

There are two furnaces placed back to back, with a common smoke flue connection to the chimney. These furnaces are the same dimensions, but are unlike in interior construction. Furnace No. 1, designed by Mr. H. De B. Parsons, originally followed the same general construction as that of the Forty-seventh street Incinerator, except that there were two separate cells instead of three, and two charging holes placed on the side and delivering the refuse over a short incline to the fire grates which form

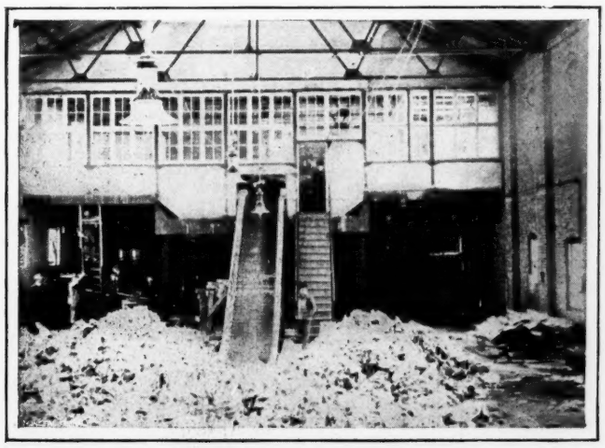


FIG. 12.—TIPPING FLOOR, FOOT OF CONVEYOR— BOILER, PRESSES, BUFFALO, N. Y.

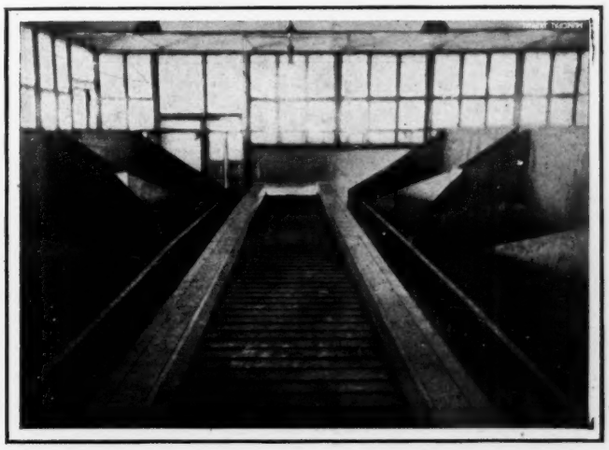


FIG. 13.—SORTING FLOOR, CONVEYOR AND PICKING BINS, BUFFALO, N. Y.

the floor of each of the two cells. The grates consist of wrought-iron bars riveted up in sections. Each cell is a complete furnace in itself, having a charging hole, and stoking and ash pit doors.

The gases of combustion pass upward to a cross flue which is connected with the boiler and the stack, and is controlled by large fire clay dampers. Each cell has a sliding door in the front end for the admission of large pieces of furniture, mattresses, etc.

The second furnace, designed by Mr. F. L. Stearns, of the Department of Street Cleaning, is practically the same size, but has a different arrangement of feed holes and grates. There is but one side feed-hole, which is a straight passage from the charging floor to the fire grates, the other feed-hole being on the top near the outlet, and large enough to receive barrels and other bulky matter. There are two sets of iron fire grates, placed horizontally, one above the other, so that partially burned matter from the upper set of grates may fall to the lower and there be wholly consumed, the ashes being raked out of the ash pits below.

There are two 200 H. P. Sterling water tube steam boilers, each with 1,950 sq. feet of heating surface. These are provided with the regular fire grates for using coal, and can be run independently of the incinerators. The boilers are fed from a pump in the adjoining building, the feed line passing through an economizer coil in the base of the stack, which heats the feed water to a high temperature.

In the adjoining building are placed two 100 K. W. and one 50 K. W. direct connection engines, with generators of multipolar direct-current type, wound for 250 volts, operating a three-wire system. Their ratings permit an overload capacity of 25 per cent. The distribution which is controlled by an eight panel switchboard, provides for two circuits for local lighting and five for the Bridge, which are arc lamps connected on the multiple system.

The chimney of these incinerators is of the radial brick type, and is 200 feet high; inside diameter 4½ feet at the top. The foundation is concrete, 14 feet thick, on 30 foot piles over an area twenty-four feet square.

The cost of the building, chimney, furnaces, conveyor and outside driveway was.....$34,193.00
Boilers and Electrical Equipment..... 49,391.00

$83,584.00

The saving effected by this method of disposal over the former one of dumping is stated to be $30,300 a year. This is 36.8 per cent. of the cost, and at this rate the whole expense of the plant, maintenance and repairs will be paid in three years. The amount of refuse handled daily (approximately 1,050 cubic yards) is about one-fifth of the total daily output of the boroughs of Manhattan and Bronx. No accurate reports of the amount of steam power developed are yet available, but it is hoped that the information will be forthcoming later.

The plan by which these furnaces are charged by hand-feeding of refuse deposited by the conveyor through an inclined chute at the side and through the top feed hole of Furnace No. 2, is to say the least awkward and expensive. It is necessary to have two men stationed at each of the charging holes above when in use, and two or more below on the firing floor to drag the refuse down with hooks through the side feed flues before it can reach the combustion chamber of either furnace and be distributed over the grates. The number of men required is greatly increased over that necessary to work furnaces that have direct automatic charging apparatus.

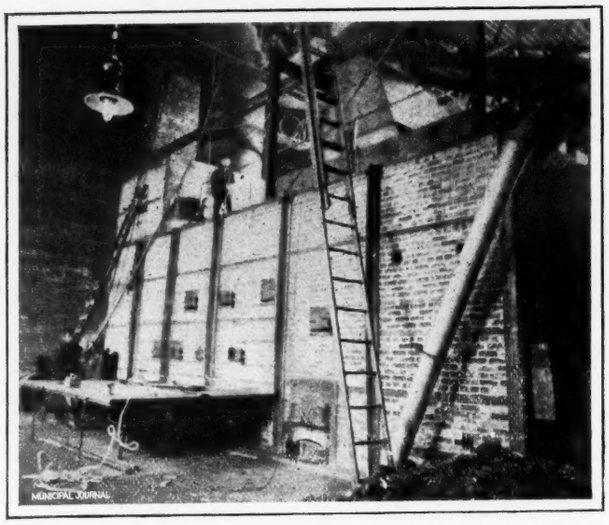


FIG. 14.—REFUSE DESTRUCTOR, FORCED DRAFT PIPING, STEAM BOILER, CONVEYOR, CHARGING CHUTES AND ASHES FROM REFUSE, BUFFALO, N. Y.

Since the installation of this plant it has been found necessary to put in another driveway for the collection carts, and also to place a ventilating monitor on the roof to permit the escape of noxious dust and gases.

Some changes are already being made in the construction of Furnace No. 1 by removing the cross-wall between the cells, closing up the side charging holes, and opening others in the top of the arch. These changes will undoubtedly add to the efficiency of the plant and to economy in its operation.

FIG. 15.—THE DELANCEY STREET REFUSE DISPOSAL STATION UNDER WILLIAMSBURG BRIDGE, NEW YORK CITY.

The Final Disposition of the Ashes and Refuse of Brooklyn

In July, 1903, a five year contract was made with the American Railway Traffic Company, organized to take over the contract from private parties for the final disposition of the ashes, street sweepings and refuse collected in the borough. There were established thirteen receiving stations, built and maintained at the expense of the company, at which the wastes (not including garbage) were delivered by the city carts. At two stations the carts discharged directly into cars run over the trolley lines of the Brooklyn Rapid Transit Company to a dumping ground near Coney Island. At eleven other stations the city carts discharge the ashes and sweepings into steel bins having a capacity of 9¼ cubic yards, weighing, when loaded, from five to eight tons. Four bins constitute a load, which is taken to the dumping ground by trolley. All ashes and street sweepings are disposed of in this manner.

The refuse, separated at the houses, is delivered by the city carts at the stations in separate buildings, wherein the marketable portions of the rubbish are recovered by sorting, the residuum being sent with the ashes to the dumps, or to the East New York Disposal Station, where it is destroyed and the steam power generated is utilized.

At one station a small incinerator of the Decarie type, with a belt conveyor has been operating since June, 1905. The largest daily amount received here is sixty loads of 6½ cubic yards of refuse only.

The East New York Disposal Station

The largest station operated by the American Railway Traffic Company, under their contract with Brooklyn, is at East New York, a suburb of Brooklyn proper.

The building of this station is 150 ft. by 75 ft., wooden frame, corrugated iron covering, two stories high. One-half the area of the upper floor space is devoted to the ash collection teams which dump their loads into pockets, or bins, beneath which the cars of the trolley line are loaded.

The other half of the upper floor contains a short belt conveyor for sorting the refuse brought by city teams, the picking bins, and the office. The second half-floor below has another conveyor which receives the rubbish brought from the other stations, and which is burned without further sorting.

Conveyor No. 1, above, discharges into Conveyor No. 2 below, and the latter discharges directly into the furnaces.

The incinerator is a double furnace of the "bagasse burner" type the fire boxes being divided by a bridge wall so that either may be run independently of the other. There are two grates placed horizontally; the upper consists of iron pipes connected into headers outside the furnace, for water circulation, and spaced one foot apart. The lower grates are of the usual castiron firebar pattern. There are two doors at the front of each furnace for stoking and for removing ashes. Both furnaces connect with a common combustion chamber, and this with a Sterling water tube boiler of 300-horsepower. The chimney is of radial brick type, 100 feet high.

The steam power employed is about one-half the capacity of the plant, and is utilized for operating an air compressor for drills and hammers in the neighboring repair shop of the B. R. T. R. R. Co., and for heating the buildings and running the conveyors.

The ash collection is from 50 to 70 loads, and the refuse 20 to 40 loads daily. All the baling is done by hand.

There is no available data in regard to the amounts sorted and destroyed at this station, since this is a private contract and is not under the control of the city. The American Railway Traffic Company is annually transporting one million yards of material, which represents the ashes, street sweepings and rubbish left after sorting. The company receives 39 cents per cubic yard for this work of final disposition, besides the revenue from all recovered material and the value of the steam power generated at the incinerator plant.

During the period that this system has been in operation, three and one-half years, about eighty-five acres of sunken marsh land have been raised to the grade of the surrounding country and made good taxable area.

Final Disposition of Refuse at Lowell, Mass.

Since 1892 this city has destroyed its garbage by cremation in an Engle Cremator, except during the winter months, when it has been sold to the farmers for feeding swine. This cremator is not of sufficient capacity for the work required, and in 1905 the city erected a small incinerator of the Decarie type for the disposal of the refuse, at a cost of $10,000, not including the building.

There is no available data concerning the working of the incinerator, but it is understood that it is operated a few hours each day, burning refuse and rubbish only. No steam power is developed, nor is the plant suitable, or intended to be used, for the disposition of garbage.

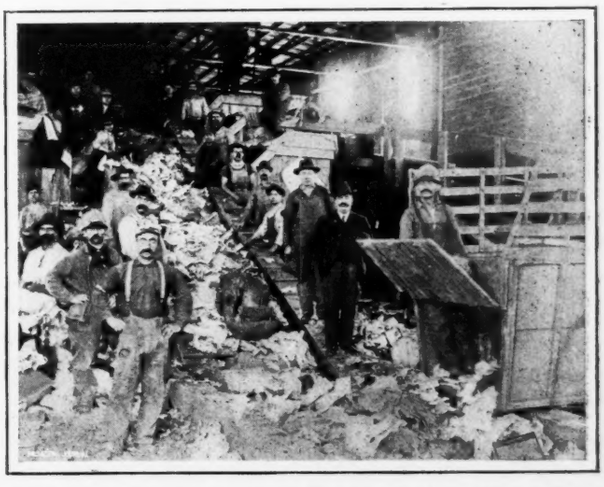


FIG. 16.—THE CONVEYOR AND PICKING BINS; DELANCEY STREET STATION, NEW YORK CITY.

The installations described above are the only ones in this country where the method of refuse utilization is employed in municipal work. The calorific value of refuse as fuel for obtaining steam power will be considered later.

The Treatment of Municipal Ashes

In waste disposal work ashes are taken to be the residuum of the combustion of every variety of coal used for household and industrial fuel.

Considerable variation in the ashes of American coals is found in different localities, as shown in the following table:

Table XV. Approximate Analysis and Heating Values of American Coal

Kinds of Coals and Localities	*Fixed Carbon, Per Cent. Combustible*	*Volatile Matter, Per Cent. Combustible*	*Ash per Lb. Coal*	*Heat Units Per Lb. Coal*
Anthracite, Penn. and Col.	100 to 92	0 to 8	10.	13,700
Semi-Anthracite, Penn. and W. Va.	92 to 87	8 to 13	8.7	13,800
Semi-bituminous: Ill., Ind., Ia., Mo.	87 to 78	13 to 25	5.6	14,700
Bituminous: Pa., W. Va., Va., Ga., Ky., Tenn.	78 to 50	25 to 50	6.	13,600
Lignite: Mon., Wy., Col., Wash., Id., Cal.	Below 50	Above 50	5.	10,000

The refuse of a coal fire includes fine ash, clinker, slate, coal partly coked, and unburned coal. The proportion of each varies with the variety of coal, the kind of furnace, and the skilfulness of the fireman. The ashes of anthracite coal burned in the houses of the larger Eastern cities have been analyzed, and the results given by Waring,* tabulated and reported by Koyl and Craven, are accepted as the standard.

* Disposition of the Wastes of New York City. G. E. Waring, Jr., 1899.

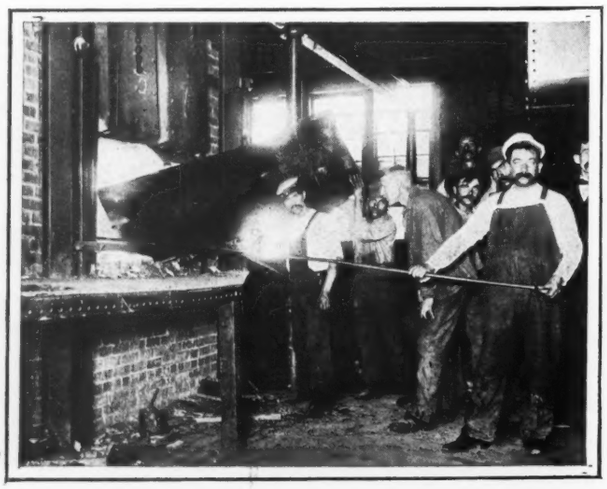


FIG. 17.—CHARGING AND STOKING FURNACE, NO 2; DELANCEY STREET STATION, NEW YORK CITY.

Table XVI. Analysis of Ashes from Anthracite Coal, New York City

Average House Collection	*Apartment Houses*	*Large House Furnaces*	*Factory Egg and Nut*	*Steam Boilers, Pea Coal*
Unburned coal recoverable.....20%	35%	40%	25%	20%
Clinkers and partly-burned coal.....15%	20%	15%	30%	40%
Coarse ash and slate.15%	....	....	....	....
Fine ash.....50%	45%	45%	45%	40%

The proportions of unburned coal, clinker and fine ash by volume are very nearly the same as those by weight given above. This analysis was made shortly after the separation of wastes was instituted in New York City, and the quantities of unburned coal quoted in this table were then thought to be very large, but have since been found to be correct. Every municipal ash collection contains a large percentage of fuel, as may be seen by observing an ash heap from which the rain has washed the fine ash, leaving the unburned coal exposed.

The value of this fuel for heat production is an important factor in waste disposal work. Assuming that 20 per cent. of the coal and burnable clinker is recoverable it represents 400 pounds of fuel per ton of ashes, and the value in heat units and rate per ton is shown in the following table:

Table XVII. Heating Power and Value of Waste Coal (Koyl).

	Average heat Units	*Per Ct. of Heat Units*	*Value per Ton Recovered Coal*
New Coal.....	11,000	100%	$5.50
Recovered coal and clinker.....	8,000	73%	$4.00 } from ashes of new coal

Later tests of these ashes from households has shown the coal and clinker that can be utilized as fuel under forced draft to be larger in quantity but less in volume of heat units, averaging coal and clinker 35 per cent. and 5,000 B. T. U. of heat.

The utilization of clinker from clean steam ashes for concrete manufacture of certain kinds is well-known, and is increasing in favor. In many places fine ash is screened, sifted and ground, and used as a constituent of mortar, with good results. Tests of this mortar demonstrate that it possesses the tensile strength of 65 lbs. per sq. in., as compared with that of ordinary lime and mortar of 15 lbs. per sq. in., and that it has a crushing strength of 1,000 lbs. as against 150 lbs. strength of ordinary mortar.

A large factory in New York uses fine coal ashes as a substitute for sand in certain kinds of brick-making, with entirely satisfactory results. It is also widely used for fireproofing in floor filling and similar construction work

(*To be continued.*)

Brevities—ALBANY, N. Y., is to have a new gas tank with a capacity of 2,000,000 cubic feet, the largest in the country with the exception of the holders in New York City and Baltimore.

ALLIANCE, OHIO, women, becoming incensed at the wrangling of the Council and the Board of Public Service as to the best method of cleaning the streets, organized themselves into a "cleaning party" and with hoes, shovels, brooms and hose did the work.

ATHENS, GA., has retained R. Winthrop Pratt, Chief Engineer of the Ohio State Board of Health, to prepare plans for a sewage disposal plant.

ATLANTIC CITY, N. J., has been entertaining the National Municipal League at their twelfth annual meeting. The meeting was largely attended and was addressed by speakers of national reputation. The determination to give American cities the best municipal government in the world was evident.

CHAMBERSBURG, PA., has adopted the system of furnishing water by meter, hoping to wipe out the floating debt of $13,000 with the increased revenue.

CINCINNATI, OHIO, City Council recently provided increases in the Police and Fire Departments aggregating $80,000.

DETROIT, MICH., has appropriated $6,750 to provide for medical inspection in all its schools.

EAST GREENVILLE, PA., will secure an acetylene gas plant to light the town, having found that electric lights would be too costly.

GLOUCESTER, N. J., is considering means of securing a better water supply. Artesian wells, according to engineers, will not furnish enough water, and it will be necessary to pump muddy water from Newton Creek.

GRAND RAPIDS, MICH., will submit a Sunday theater ordinance to the people, a sufficient number of signatures to a petition having been obtained to compel such reference.

HAMILTON, CANADA, has paid to American companies during the past five years $209,000 for cement for sidewalk construction.

JACKSONVILLE, FLA., is undergoing a transformation. Among the large number of improvements to be made is a modern coaling station for the St. Johns River Terminal Company, with a capacity of 4,000 tons.

LEXINGTON, KY., is to have a garbage crematory, several conferences having been held recently by F. K. Rhines, Superintendent of the Dixon Garbage Crematory Company, of Toledo, Ohio, and Henry Brower, who has been selected as foreman in charge of building a plant.

LOWELL, N. C., has completed its 3,000 horsepower dam and will soon have electric power.

MANCHESTER, CONN., is to have a new fire house, probably of concrete construction, according to plans prepared by Dr. F. A. Sweet.

MINNEAPOLIS, MINN., has a committee consisting of Aldermen W. E. Satterlee, Michael A. Gerber, and Frank L. Schoonmaker, assisting the Improvement League in making the city clean.

NEWARK, N. J., receives its city water through steel pipes twenty miles long; they serve a purpose for which they were not especially designed. According to City Engineer Sherrerd the water is purified to a remarkable extent through the action of anaerobic bacteria, a series of tests showing a great reduction in bacteria at the Newark outlet.

NEW YORK will probably have voting machines, as a bill has recently passed the State Senate carrying an appropriation to try the machines in eight Assembly Districts in the city.

OSCEOLA, ARK., has sunk a 700-foot well for its new waterworks.

PHILADELPHIA, PA., Board of Education has reached the conclusion that filters in the public schools are worse than useless, and Superintendent of Buildings Cook has been directed to confer with Director Coplin, of the Board of Health, with a view to replacing the filters with sterilizers.

PITTSBURG, PA., Councils have decided to make the rate on the new $1,500,000 issue of bonds for water extension and the liquidation of judgments 4 per cent. instead of 3½ per cent., on account of the present flood on the market.

ROCKWOOD, PA., is to have a new water system, the dam in Somerset County having an 80-foot breast, submerging 70 acres and impounding 68,000,000 gallons of water at a height 500 feet above the town. The static pressure will be 230 pounds to the square inch, thus making it unnecessary to have a steamer for fire protection.

SAN FRANCISCO, according to Mayor Schmidtz, is "determined to restore to the nation its chief port on the Pacific."

ST. LOUIS, MO., will improve the Harlem Creek sewer at an expense of $200,000, and the Rocky Branch sewer at a cost of $125,000.

TACOMA, WASH., recently put into effect nine amendments voted at the last election. They provide: That bridges and viaducts be included in improvement of streets and alleys that may be undertaken by the city; supervision by the city of public improvements, work done by private parties; that the street car company pay the cost of paving between its tracks and two feet on either side of its rails; that the city have the right to grant a franchise for bridging the city waterway; that the salaries of the Mayor, City Treasurer and City Comptroller be increased; that the Council be empowered to employ experts who are not residents of Tacoma; that triangular lots be assessed as 25-foot lots; that the city's money be deposited in local banks, not more than 50 per cent. of the total to be in any one bank, and prohibiting the granting of any supplementary public franchise for a longer period than the original plan.

TOLEDO, OHIO, officials and representatives of the electric lighting companies, are considering means of bettering conditions in the matter of wiring.

WILMINGTON, DEL., has a population of only 85,000, according to a census taken by the police. Much dissatisfaction has been expressed, but a recount is improbable.

IN OTHER COUNTRIES

A Collated Survey

ALMERIA, SPAIN—A farmer is planting eucalpytus and pine trees for the manufacture of disinfectants and for supplying cities with sanitary arborage as a commercial venture. His trees have grown from 9 to 15 feet in a year and a half.

AMSTERDAM, HOLLAND—The Algemeen Nederlandsch Exportblad, P. O. 162, will supply information regarding civic and market conditions.

ALTONA, GERMANY—A bathing institution will be built here at a cost of 800,000 marks.

ANTOFAGASTA, CHILE—This city will spend $560,000 for port improvements.

AUCKLAND, NEW ZEALAND—The R. D. C. are about to borrow £15,000 in connection with the proposed sewerage works at Dene Beck.

BALLARAT, AUSTRALIA—The City Council stone breaking plant was recently started at the city quarry. The plant cost $18,000 and is expected to pay for itself in five years.

BANGKOK, SIAM, will receive bids for railway equipment for a government railway next September. This is expected to increase the commerce of the city.

BEN ZIREG, ALGIERS, on the line of the new railway from South Oroso to Beckar, a few years ago an oasis in the desert, is now a town transacting a business of $2,000,000.

BERLIN, GERMANY—Families differing widely in degree of prosperity live in the same flats. There are but few areas in German towns inhabited solely by the poorest working classes.

BIRMINGHAM, ENGLAND—The City Council decided recently to purchase from Sir Robert Peel's trustees 738 acres of land at Kingsbury, near Tamworth, under the Military Lands Act, as a range to be used by local volunteers. The cost will be £23,200.

BOGOTA, COLUMBIA, will be connected with Barrigan on the Metariver by a wagon road. There is already a mule road between the towns that can be widened for carts.

BRADFORD, ENGLAND—The Finance Committee of the Bradford Corporation has passed orders for the issue of cheques amounting in the aggregate to £239,742 in payment of the Eshot estate which has been acquired by the Corporation for carrying out a scheme for the purification of sewage of the city.

BURY, ENGLAND—Sewerage and sewage disposal works, for which the Rural District Council is desirous of borrowing £6,200, was the subject of an inquiry conducted by Mr. Bicknell, M. Inst. C. E.

CAIRO, EGYPT—The official inauguration of the new artesian wells took place recently. Ten wells are sunk and ten more will be required to complete the system which will supply 100,000 cubic meters of pure water.

CANTON, CHINA—A strictly Chinese enterprise is the building of a railway to San Wu. The company intends to seek a concession for light and power. The narrowness of the streets, impossible for street cars, limits their enterprise in that direction.

CALCUTTA, INDIA, has produced a large suction pump dredge of sufficient capacity to handle 5,000 tons per hour. The river Hooghly is to be improved.

CAPETOWN, CAPE COLONY—The Wemmer's Hock project recommended by a Joint Water and Drainage Committee of the Suburban municipalities will probably have the support of the city.

CHEMULPO, KOREA—A telephone service has been opened connecting that city with Seoul.

CHRISTIANIA, NORWAY, is the home of two engineers who have invented a new method of producing iron from ore. The ore is crushed and separated by magnets. These men are looked upon as benefactors to their city.

CIENFUEGOS, CUBA, is negotiating a loan for $3,000,000, for the construction of aqueducts and sewage system.

CORDOVA, SPAIN—The city has decided to abandon its sand filters and use filtration galleries.

CORINTO, NICARAGUA—An oil refinery will be established. The crude oil will be brought from California. It is anticipated that this new enterprise will materially aid the city's condition.

DERBYSHIRE, ENGLAND—Rapid progress is being made with the great waterworks scheme which will transform the Derwent Valley into a series of lakes for supplying Nottingham, Leicester, Derby and Sheffield with water at an eventual cost of some £7,000,000.

DRESDEN, GERMANY, has a technical high school whose buildings have cost 5 1-2 million marks. In connection with it is the Royal Mechanico-Technical Testing Institute.

DUNDEE, SCOTLAND—The Surveyor has submitted a claim to the corporation for remuneration for extraordinary services amounting to $200,000, the services covering a period of 38 years and the particulars of the claim occupy a pamphlet of 48 pages.

FIUME, AUSTRIA, invites bids for a municipal electric railway.

FREEBRIDGE LYNN, ENG.—A young lady has secured a scavenging contract under the Freebridge Lynn District Council.

HANOVER, GERMANY—Siemens and Halske have a new method of propelling canal boats by electricity.

HARROGATE, ENGLAND—The Urban District Council have decided to continue the use of Akonia this season. It will be remembered that Akonia proved a great success during last year, where the traffic of motors is very considerable.

KOBE, JAPAN—The Railway Company have decided to issue debentures not to exceed 2,500,000 yen for supplying light and power to the city.

LIEGE, FRANCE, will hold an international exposition of foodstuffs during July and August next.

LIMA, PERU—A loan of $3,000,000 is said to have been negotiated in New York for the electrification of street railways.

LIMERICK, IRELAND—The Corporation of Limerick are going to treat some of their roads with Akonia. This will be the first test in Ireland.

MADRID, SPAIN—The Public Works Department will build electric lines.

MANILA, P. I. — Thirty-six thousand dollars has been appropriated to investigate different ports suitable for railway terminals.

MARSEILLES, FRANCE—The transporter bridge has been completed and tested. The span of the bridge is 165 meters and the height is 82 meters.

MILAN, ITALY—A system of modern tenement houses will be built to supplement the sanitary lodging houses which furnish good quarters for 60 cents per week. $1,000,000 will be spent on building 48 houses of 500 rooms each.

MILAN, ITALY—The Exhibition Commissioners offer prizes of $800 and $300 for the exhibit and test of best two models of street-cleaning machines, irrespective of cost.

NEW CASTLE, AUSTRIA—There will be spent by the city $200,000 on harbor improvements, including wharves, jetties, mooring dolphins and rock excavations.

NURNBERG, GERMANY—A new city administration building will be built at a cost of $580,000.

PARIS, FRANCE—The municipal authorities are extending their trials of "lusol," a hydro-carbon recovered in coke making. The light is said to be softer than alcohol and is very cheap, a hundred candle power lamp costing half a cent an hour.

WHO'S WHO IN MUNICIPAL WORK

CUTLER, James G., Mayor of Rochester, 1904-1905; re-elected, now serving second term, 1906-1907; born Albany, N. Y., April 24, 1848; son of John N. and Mary E. (Goold) Cutler; married Anna K. Abbey, Kingston, N. Y.; removed to Rochester, 1872; architect by profession; fellow American Institute of Architects, New York Architectural League; ex-President Western New York State Association of Architects; original inventor and patentee of mail chute; founder of the business of the Cutler Manufacturing Company; Vice-President Alliance Bank; Director Rochester Trust & Safe Deposit Company; Trustee Rochester Savings Bank; Commissioner to draw charter for cities of the second class, 1894; Presidential elector, 1896; Commissioner of Public Safety, 1900; ex-President Rochester Chamber of Commerce; member National Arts Club and Republican Club, New York City; Rochester Club, Genesee Valley Club, Rochester Whist Club, Rochester Yacht Club, Rochester Country Club, Oak Hill Country Club, National Municipal League, American Association Political Science, etc. *Residence, Rochester, N. Y.*

ELLISON, William Bruce, Commissioner of Water Supply, Gas and Electricity, New York; born at St. Thomas, Canada, in 1857; educated in the public schools of Canada; admitted to the Canadian bar in 1880; admitted to the New York bar in 1882, since which time he has been in practice for himself. Elected to the New York State Assembly in 1892, from the then 23d District, lying west of Central Park, between 72d and 120th streets; was the only Democrat ever elected from the district and ran far ahead of the national, city and county tickets. Appointed Commissioner of Water Supply, Gas and Electricity by Mayor McClellan, January 1, 1906. Author of "Canadian-American Fisheries," "Unification of the United States and Canada," "Insurance Companies Before the Courts," and "Conflicting Constructions by the Courts of the Standard Policy." *Residence, Hotel Marseille, Broadway and 103d street, New York City.*

FITZGERALD, John F., publisher of *The Republic,* Mayor of Boston, was born February 11, 1865, in Boston, Mass. He was a member of the Boston Common Council of 1892, and was elected a member of the Massachusetts State Senate in 1893 and 1894. He was elected to the Fifty-fourth, Fifty-fifth and Fifty-sixth Congresses as a Democrat; elected Mayor of Boston in December, 1905, for a two-year term. He was educated in the public schools, the Boston Latin School, and for one year studied medicine at Harvard Medical School. *Residence, Boston, Mass.*

GILLETTE, Cassius E., Chief Engineer Bureau of Filtration, Philadelphia, Pa. Born at Jasper, N. Y., December 19, 1859 son of Ralph and Adelia (Baker) G Graduated from State Normal School, Mansfield, Penn., 1879; United States Military Academy, West Point, New York 1884, second lieutenant of Engineers, U. S. Army, July, 1884; first lieutenant, 1887; captain, 1895; major, 1903; resigned to accept present position, 1906. In charge of improvement of Humboldt Harbor, Cal., Savannah Harbor, Ga., and others. Built jetties at Cumberland Sound, Ga., and Fla. Author of "Sea Coast Harbors," "Filtrations of Public Water Supplies." *Residence, Hotel Normandie, Philadelphia.*

MACFARLAND, Henry B. F., born in Philadelphia, February 11, 1861, eldest child of the late Joseph Macfarland, the well-known journalist, who took the family to Washington at close of the civil war. Educated in private schools, graduated Rittenhouse Academy, Washington, and read law in office of late Hon. W. B. Webb. In December, 1879, entered Washington bureau "Boston Herald," becoming chief of bureau in 1892, and being otherwise engaged as Washington correspondent and general writer. In October, 1888, married Mary Lyon Douglass, daughter of Hon. John W. Douglass (formerly of Erie, Pa.), sometime Commissioner District of Columbia. Appointed Commissioner of the District of Columbia by President McKinley, entered upon his duties and was elected President Board of Commissioners of the District of Columbia May 9, 1900; reappointed Commissioner by President Roosevelt and entered upon his second term May 9, 1903, and re-elected President Board of Commissioners. Was Chairman of the National Capital Centennial Committee, in 1900, and delivered the Centennial address at White House December 12, 1900; delivered District of Columbia Day address at Pan-American Exposition, September 3, 1901; also similar address on District of Columbia Day at Louisiana Purchase Exposition, October 19, 1904. Is President of William McKinley National Memorial Arch Association, of Rock Creek Park Board of Control, and of Washington Public Library Commission, and Chairman National Committee on the Proposed Change of Inauguration Day. *Address, District Building, Washington, D. C.*

PARSONS, Frank, lecturer on law. Boston University, since 1892; professor of political science and economics, Ruskin College, Trenton, Mo., since 1900; born at Mt. Holly, N. J., November 14, 1854; son of Edward and Alice B. (Phees) P.; graduated in mathematical and engineering course, Cornell, 1873; unmarried. Was on railway engineering staff; later taught school; admitted to Boston bar; chief clerk for Boston law firm for a time; then opened offices of his own; lecturer in Boston University Law School, 1892-1902; text writer for Little, Brown & Co., publishers; public lecturer on economics and sociology; speaker at many of the meetings of the League of American Municipalities and other conventions in the interest of municipal progress; professor of history and political science, Kansas Agricultural College, 1897-1900; lecturer at People's Institute, Cooper Union, and for New York School Board, on New Zealand history, 1904-1905; lecturer at Wellesley College, on city government and municipal trading, 1906; member American Academy Political and Social Science, American Social Science Association, etc.; president National League for Promoting Municipal Ownership of Monopolies and of the Boston Municipal Ownership League; member Municipal Ownership Commission organized under auspices of National Civic Federation for investigation here and abroad, 1905-1906. Author: "The World's Best Books," 1892 L6; "Our Country's Need," 1894 A3; "The Drift of Our Time," 1898 K1; "Rational Money," 1899; "The New Political Economy," 1899; "The Power of the Ideal," 1899 A3; "The City for the People," Equity Series, 1900; "Direct Legislation," Equity Series, 1900; "The Bondage of Cities"; "The Story of New Zealand," Equity Series, 1904; "The Railways, the Trusts and the People," Equity Series, 1906; "The Heart of the Railroad Problem," Little, Brown & Co., Boston, 1906; joint author of "Municipal Monopolies," Crowell & Co., New York, 1900, and "The President's Railroad Policy, Ginn & Co., Boston, 1905. Contributed to *Arena* and other journals series of articles on "The Philosophy of Mutualism," "The People's Highways," "The People's Lamps," "The Telegraph Monopoly," "Great Movements of the Nineteenth Century," "Industrial Arbitration," "Railway Methods and Their Results," "Public Ownership," "Insurance," etc., etc. *Residence, 11 St. James Avenue, Boston, Mass.; (summer) Mt. Holly, New Jersey.*

TILLSON, George W., born in Thomaston, Me., December 18, 1852. Graduated in 1877 from Engineering Department Bowdoin College. Teaching in different schools until 1880. In February, 1880, was employed on the sewerage system of Memphis, Tenn., under Colonel George E. Waring, Jr. In the fall of 1880 made plans for and in 1881 had charge of a sewerage system for Kalamazoo, Mich. In October, 1881, went to Omaha, Neb., to supervise the construction of sewers there. Appointed City Engineer Omaha in 1887, which position he held until 1892; 1892-1895 engaged in private engineering and contract work. Appointed Assistant Engineer Department City Works, Brooklyn, N. Y., April 1, 1895. In 1902 appointed Chief Engineer Bureau of Highways, Borough of Brooklyn, a position which he now holds. In 1900 was President of the Brooklyn Engineers' Club and at present is President of the Municipal Engineers of the City of New York and Secretary of the American Society of Municipal Improvements. Author of "Street Pavements and Pavement Materials," 1900, John Wiley & Sons. *Residence, 831 Ocean Avenue, Brooklyn, N. Y.*

WOODRUFF, Clinton Rogers, lawyer Graduate of Central High School, Philadelphia, and of the College and Law Departments of the University of Pennsylvania. Associated as counsel in leading election and constitutional cases, including "List of Voters" case; the "Party Square" case, and the right of a Governor to veto a proposed amendment to the Constitution. Secretary of the Municipal League of Philadelphia, 1892 to 1897, and counsel for the same body from 1897 to 1903. Was a member of the Legislature, 1898-1900, introducing the personal registration amendment to the Constitution, which was the only amendment to the Constitution since its adoption in 1874. Secretary of the National Municipal League since 1894 and the editor of its proceedings; President of the American Park and Outdoor Art Association, 1902-1904, and First Vice-President of the American Civic Association, 1904-1905. Chairman of the Election Reforms Committee of Pennsylvania. Member of the Executive Committee of the Fourth, Fifth, Sixth, Seventh, Eighth, Ninth and Tenth Lake Mohonk International Arbitration Conferences, and Secretary since 1900. Special Inspector of the Interior Department with Charles J Bonaparte to investigate affairs in the Indian Territory, 1903-1904. Mr. Woodruff is a frequent contributor to magazines and newspapers on municipal and civic topics. *Address, North American Building, Philadelphia, Pa.*

REPORTS REVIEWED

Augusta, Ga.—Reports of Departments.—The mayor makes a graceful tribute to the efficiency of city staff, saying "the time has passed when one individual can arrogate to himself the accomplishment of all the good consummated during any given period in a city of the size and importance of Augusta." The sewage problem is a simple one, as the city happens to be situated on a river (the Savannah) whose waters no town situated below it cares to drink. There was a time, however, when Savannah river water was much sought by sea captains on account of its remarkable property of keeping pure during a long voyage. The work of building a six-foot main and laterals was undertaken, partly in cooperation with the county, the extensions reaching altogether five miles.

Baltimore, Md.—Comptroller's Report.—1905.—This report is made in accordance with the uniform system of accounting of the National Municipal League. The first part of the report deals with receipts, appropriations and expenditures and the second part concerns the taxable basis, assets and liabilities. In Part I, consolidated summary statements appear first. Then follow subsidiary detailed statements of the items in the first schedule; then more detailed statements of the items in the secondary schedules, and so on, down to the lesser items of the accounts. The distinction is made between "Revenue and Expense" account and the "Balance Sheet" accounts, which are statements of the city's assets and liabilities at the end of the fiscal year. The distinction is made between ordinary and extraordinary revenues—the latter relating to income from extraordinary sources, like borrowed money. Totals, and afterward details, of department accounts are not arranged in alphabetical order, but in an order based on the general purpose or function of each department of the municipal government. This feature is an original creation of the League.

Columbus, Ohio.—Sewage Purification.—Report of George A. Johnson, Engineer in charge of the Sewage Testing Station to the Chief Engineer of the Board of Public Service. This report includes a complete account of the method and apparatus used in disposing of the city's sewage. Elaborate tables of tests and other data are given, all of interest and value to the sanitary engineer. The Board of Public Service desire to have it known that they are unable to meet the cost of sending out copies of the report. Anyone desiring a copy is requested to inclose 19 cents for postage, or order report to be sent by express, C.O.D.

New York.—Comptroller's Report.—Volume II. is a continuation of the annual report of the Comptroller of the City of New York for the year 1903, and contains schedules of details amplifying the tables and statement contained in Volume I. The volume contains over five hundred pages and gives items of the expenditure of $97,000,000.

Ohio Board of Health.—1904.—The importance of the work in connection with the public water supplies grows each year; even small villages are requiring public water supplies. Seventy-one cities and 177 villages, comprising 55 per cent. of the population of the State, have a public supply. Municipalties have power to protect supplies for a distance of twenty miles from their limit, a limit which is insufficient. Thirty-one cities have plans for new sewage systems and 14 for disposal works. The report includes a great number of detailed reports comprising the usual work of a State Board of Health.

St. Paul, Minn.—Comptroller's Report.—1905.—The report compares the financial condition of the city now and in 1892. Although the population has increased 60,000 during that period, and building has been active, the assessed valuation of the city is $30,000,000 less than it was then. The present tax rate of 30.6 mills produces $120,000 more than was collected in 1892, the budget now amounting to $2,960,968. The total cost of administration is $16.51 per capita; the net bonded debt is $7,461,771, and the value of corporate property, $18,806,000.

Trenton, N. J.—Water Commissioners.—1905.—Few improvements were made during the year beyond the addition of 32,000 feet of mains with usual fittings and hydrants. A record of turbidity of water throughout the year was kept, and the record shows that on several occasions pumping was stopped on account of turbidity. A record of pumping during the year shows gallons pumped and coal consumed. The treasurer's report shows receipts and disbursements for the year and a statement of assets and liabilities, giving a net surplus, as figured, of a million and a half dollars.

New Bedford, Mass.—Superintendent of Streets.—1905.—A brief report, in a neat cover, of public works constructed by the department to date. No new work was undertaken during the year. The superintendent notes the unwise tendency to add new streets in the outlying districts as a severe drain on the funds of his department.

Winnipeg, Man.—City Engineer.—1904.—An interesting study of municipal operation, the City Engineer having charge of an amount of construction work that might puzzle even a large firm to handle—15 miles of sewers, 8 miles of street pavements, 15 miles of water mains and 30 miles of walks. Among the items of asphalt plant expense is the maintenance, operation and capital charges of 8½ cents per square yard on an area of 73,000 square yards of pavement. Employees of city works are insured against accident by a fund created by deducting a small percentage from the pay list and by a contribution from the city.

A COMPENDIUM

Current Topics of Municipal Interest as Treated by Contemporaries—Opinions on City Affairs

A Pernicious Scheme.—"Borough President Coler's Advisory Committee has entered a protest against the project to transplant the House of Refuge from Randall's Island to Flatbush. It is an outrageous proposition. Flatbush is one of Brooklyn's most delightful residential sections. To locate the House of Refuge there would be like painting a gallows into a pastoral scene. Penitentiaries, insane asylums and houses of refuge are very necessary institutions, but the average citizen doesn't care to live next door to them.

"It seems that the State is willing to exchange with the city that portion of Randall's Island on which the House of Refuge is located for the site occupied by the insane asylum on Clarkson Street and the adjacent Potter's Field, nearly thirty acres of valuable land, the condition being the establishment of the House of Refuge on the Flatbush property. That looks like a poor bargain for the city, and Flatbush would get the worst end of it. Aside from all other considerations, the city cannot afford to depreciate the value of property in a fine residential section by locating a penal institution there. The absurdity of such a policy is self-evident." **The Taxpayer**

Cities at the Mercy of the Legislature.—"Almost every speaker on the program has urged the need of a thorough revision of the Constitution of Michigan to correct the many inadequacies of our fundamental law, as the same have been made apparent by the continued growth of the cities of the State. The present Constitution was adopted more than fifty years ago, when the cities of the State contained quite an insignificant portion of the population, and at a time when the people were suffering from an acute attack of internal-improvementphobia. As the Constitution now stands, the form of government in Michigan cities is left entirely in the hands of the Legislature, the people most concerned having nothing to say, except by way of suggestion, as to what shape their local government shall have. Moreover, the present plan forces the Legislature to give over fully half of its time to the consideration of local measures, to say nothing of the abundant opportunities which it offers to further ripper legislation. We believe that the cities of Michigan are vitally interested in securing changes in our Constitution." **Civic News**

How They Do It in Bombay.—"If the Bombay Corporation was too easy with their old Tramway Company, they are not going to fall into that error this time. Apparently they are so opposed to the new company making extensions that they are set on obstructing new lines as far as they possibly can. Where English regulations insist on 9 feet 6 clear between the nearest rail and the curbstone, and their own previous rules exacted 12 feet, the corporation now demands 16 feet clear of the side of the tram car. Those who promoted the resolution that fixed the 16 feet are apparently sure that the Tramway Company will inevitably extend its lines, be the cost what it may. So sure are they that the company will agree to widen the streets rather than not build extensions, that they offer to apply the corporation's powers of compulsory purchase on behalf of the company. If that scheme comes off, it will be a very fine thing for the corporation; they will get their streets at once trammed and widened at the sole cost of the company." **Indian Engineering**

Let Us Be Clean.—"In Paterson (New Jersey) we find the editor of the *Press* taking up the annual cleaning problem in these words: 'The waste paper nuisance in this city which for a while was partly abated by municipal action is becoming as bad as ever. And in these windy March days the débris of stores and dwellings is scattered far and wide, giving all our streets a slovenly appearance, which cannot but unfavorably impress visitors. In fact, Paterson in its remissness in caring for the sightliness of its public thoroughfares might confidently enter for a prize if one were offered for the best illustrator of the art of "how not to do it," in the matter of keeping its municipal skirts clean. Surely some plan might be devised if our city fathers would set about it with earnestness of preventing the litter from stores, factories and dwellings from being practically cast into the public highways, and then whirled by every wind that blows into the faces and the yards of the just and unjust alike.' Now, here's a suggestion to the Mayor of every town and city in New Jersey: Appoint a City Cleanliness Commission of three or more members, the duties of which shall be to keep the city clean. If a public or private building needs a bath, see that it gets it before its nastiness offends the nostrils of every inhabitant. We think a Commission of this character, appointed with some discretion, would prove of great value to a town. Soap is cheap and so is water. Every town in the State that has dirty buildings and streets ought to get busy and wash up. A tendency has been shown in the past to 'Let the Gold Dust Twins do the Work,' and this means that it is never done.

"Turn on the hose!" **New Jersey Commerce and Finance**

Opposing Municipalization.—"Property, which is defined by Webster as 'the exclusive right of possessing, enjoying and disposing of a thing, whether in possession or not, an estate whether in lands, goods or money,' is seemingly modified when the property of the individual or that of the corporation runs counter to public policy or necessity. Every observer has noticed the frequency with which old laws and customs have been abrogated during recent years. Formerly the saying that 'A man's house is his castle' was everywhere accepted. This is only half true to-day. In the olden time almost any crime might be enacted within the walls of one's domicile, but now the regulatory ordinances which modern society has created say a man may not even in his own house conduct a traffic or so demean himself therein as to create a nuisance or otherwise disturb his neighbors. To apply Shakespeare's words to fit the case, the law 'alters when it alteration finds.' Therefore, at least it so seems to us, we should not place too much reliance on the interpretations which the laws may give; neither should we rest in security because of an inherent in the sense of fair play of the people to treat us justly, for unless the people are taught that greed and graft form no part of the gas company's stock in trade, a lesson that can best be given through a policy of conciliatory treatment, public service corporations generally are not likely, we fear, to receive the plaudits of the public." **Progressive Age**

Subway Air.—"If I (George A. Soper, Ph.D.) were to summarize the findings and conclusions of my investigation into the narrowest possible form, I should say that I think the New York City subway, as a whole, is sufficiently ventilated and free from conditions injurious to health, except as to the presence of metallic dust, lack of sanitary care, and conditions inseparable from overcrowding. The lack of sanitary care can, and probably will, be corrected. I do not know whether it will be necessary to do anything about the dust. If it is really dangerous, American ingenuity can certainly find a way to reduce it." **Street Railway Journal**

SOME SEWER PUMPS AND LIFTS

Descriptions and Special Features—Information Furnished by Their Respective Makers—Their Capacity and Style—Used in Every Clime

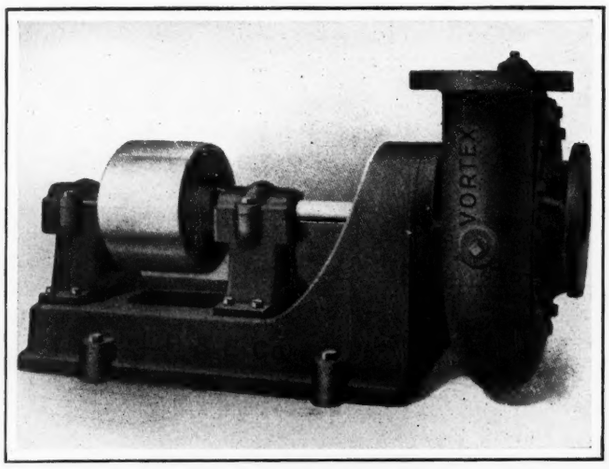
Makers. The Lawrence Pump and Engine Co., Lawrence, Mass.

Style. Vortex, centrifugal.

Range of Capacity. From 25 to 25,000 gallons per minute.

Where in use. Various places.

Special Feature Claimed. Particularly well adapted for pumping sewage or any liquid carrying solid matter in suspension.



A CENTRIFUGAL PUMP—LAWRENCE PUMP AND ENGINE COMPANY.

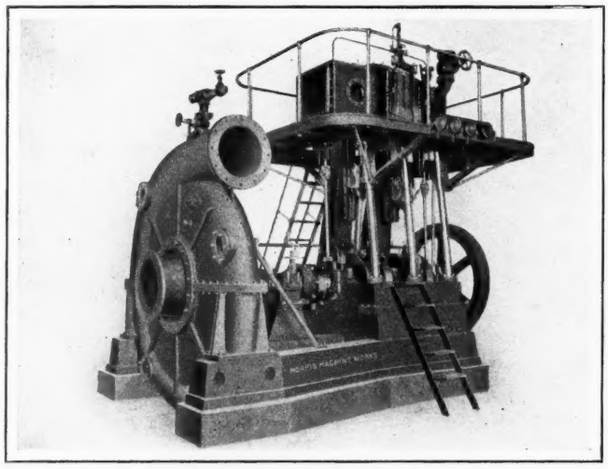
Makers. The Morris Machine Works, Baldwinsville, N. Y.

Style. Centrifugal.

Range of Capacity. Four to 10,000 gallons per minute.

Where in use. Two in Norfolk, Va.

Special Feature Claimed. Best of their kind as regards design, material and workmanship.



SEWAGE PUMPING ENGINE, USED AT NORFOLK, VA.—MORRIS MACHINE WORKS.

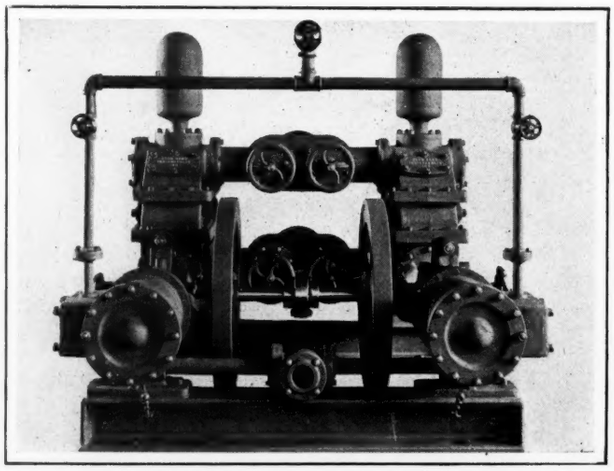
Makers. Dean Bros., Indianapolis, Ind.

Styles. Reciprocating, duplex, crank and flywheel.

Range of Capacity. From 15,000 to 60,000 gallons per hour.

Where in use. Vassar College, Poughkeepsie, N. Y.

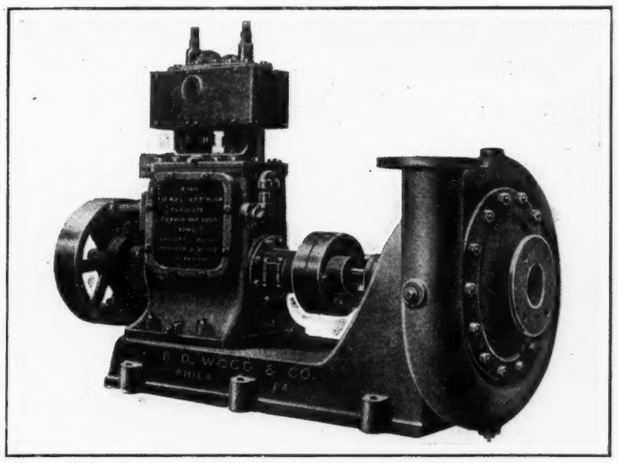
Special Features Claimed. 1. Accessibility to all parts, internal or external. 2. Flexibility as to capacity. 3. One side can be disconnected from the other and shut down for examination and repairs without interfering with the operation of the other side.



HORIZONTAL DUPLEX STEAM PUMP—DEAN BROTHERS, INDIANAPOLIS.

Makers.	The Lawrence Machine Co., Lawrence, Mass.
Style.	Centrifugal.
Range of Capacity.	Thirty to 30,000 gallons per minute.
Where in use.	Beverly and Hudson, Mass.
Special Features Claimed.	Economy and efficiency.

Makers.	The Platt Iron Works, Dayton, O.
Styles.	Vertical and horizontal triplex, with special "clapper" valves.
Range of Capacity.	Varied.
Where in use.	Pittsfield, Mass.; White Plains, N. J.
Special Feature Claimed.	Valves as above.



CENTRIFUGAL PUMP, DIRECT-CONNECTED TO STEAM ENGINE—R. D. WOOD AND COMPANY, PHILADELPHIA.

A RUMSEY ELECTRIC PUMP.

Makers.	The Edson Manufacturing Co., 255 Atlantic Avenue, Boston, Mass.
Styles.	Diaphragm, Lift and Force.
Range of Capacity.	From 1,500 to 6,000 gallons per hour.
Where in use.	Practically all over the world.
Special Features Claimed.	The most powerful hand force pump on the market with freedom from danger of clogging.

Makers.	The Dayton Hydraulic Machinery Company, Dayton, O. The Brooks Automatic Sewage Ejector.
Styles.	Vertical, Submerged, Centrifugal.
Range of Capacity.	Four thousand to 6,000 gallons per minute.
Where in use.	West Side pumping station, Dayton.
Special Features Claimed.	1. Perfect automatic regulation by patent float switch control on A. C. motors. 2. High efficiency.

Makers.	R. D. Wood & Co., 400 Chestnut St., Philadelphia, Pa.
Style.	Centrifugal.
Range of Capacity.	Six hundred to 3,000 gallons per minute.
Where in use.	New Orleans, Atlantic City, Saratoga, Cape May, etc.
Special Features Claimed.	1. Their particular adaptability to any drive. 2. Freedom from valves, which cause a clogging up of reciprocating pumps. 3. Their first low cost and good efficiencies under the conditions of large volume and low head usually encountered in this class of work. 4. Durability.

Makers.	Rumsey and Company, Limited, Seneca Falls, N. Y.
Styles.	Horizontal and vertical centrifugal.
Range of Capacity.	Ten to 4,750 gallons per minute.
Where in use.	In office buildings, apartment houses, factories, etc.
Special Features Claimed.	1. Reliability and durableness. 2. Compactness. 3. Easy to handle.

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It is also desired that the facilities furnished by the reference library in this office should be widely known and freely used by those interested in municipal affairs. Visitors will be welcomed and provided with conveniences for search, and inquiries by mail will be promptly dealt with.

NEW YORK, MAY 2, 1906.

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THE City of Columbus, Ohio, has acquired distinction and deserves credit as being the first in this country to make a thorough study, by means of actual tests, of the problem of disposing of its sewage. A number of cities, during the past ten years, have employed experts to carry out investigations into the methods best adapted for purifying water for their domestic use; the Massachusetts State Board of Health, whose reports of 1890 and annually thereafter have been recognized as authoritative both in this country and abroad, has been for years carrying on a series of experiments relative to the various methods of sewage disposal; a few—a very few—cities have thought it worth while to study the workings of their disposal plants after they are in service, Worcester, Mass., being the most praiseworthy of these; and several other States and cities have employed experts to collect information on this subject. But Columbus, for a little over a year, tested on a practical scale the operation of the several devices known to sewerage engineers in purifying its own sewage, about 350,000 gallons a day being treated, a force of fifteen being employed, and $44,004.43 being spent for this purpose, of which $17,375.23 was for salaries. As a result of this, the city is in a position to construct a disposal plant with reasonable assurance of its being the one most fully adapted to its needs; and in addition many of the data collected offer valuable information to sewerage engineers generally. It is to be particularly noted, however, that the conclusions reached are not general, but are applicable only to Columbus' problem, which is in many respects peculiar. For instance, there is no question of leaving the Scioto river potable, but only of preventing a nuisance; it is therefore proposed to store up the sewage pollution during times of low water and discharge this stored matter into the river when it is in flood, thus maintaining approximately constant the ratio of pollution to stream volume. It is not thought necessary to produce an effluent from the purification works during low water of a higher standard of purity than that of nonputrescibility. This apparently low standard (*apparently*, but many existing sewage purification plants do not maintain in practice even as high a one) is considered to be justified by the fact that the stream flows for 200 miles after receiving this effluent before it is drawn upon for a water supply.

Although neither the problems presented nor the solution proposed is a general one, these experiments offer much information of service to other communities. Nothing startlingly new is brought forward, but emphasis is placed on several features of purification, and further data offered on the latest methods which have been advocated here and in England. Of the features emphasized, perhaps the most important is the desirability of subdividing the purification into several stages. The main subdivisions into which the operations were made were two, preparatory and finishing: but each of these was further subdivided into two or three processes. While this multiplication of stages of treatment would appear to render the purification more complicated in operation, with a resulting increase in cost of maintenance, this would undoubtedly be, in many cases, offset by the resulting reduction of area required, and other important advantages.

Few data have heretofore been available on the treatment of American sewages in contact beds and sprinkling or trickling filters, and those gathered during this investigation will be of especial interest to sanitarians in this country. The experiments with contact filters do not seem to have been as successful as many conducted in England during the past few years, but excellent results were obtained with the trickling filters. Further reference to these will be made in a future issue. Mr. George A. Johnson was engineer in charge of these tests, and there will be found in another part of this issue a summary by him of his excellent report upon the same.

New York's Dirty Streets

A MAN who probably knows the municipal world as thoroughly as any living person is Dr. Arthur Shadwell. This gentleman has visited many and various cities of the Globe and is a most careful observer. Dr. Shadwell, moreover, takes much personal interest in civic well being; his articles on local option in Gothenberg, Sweden, contributed to the *Senate,* London, England, are among the most profound of their kind. Therefore, when he states in cold type, after studying the great industrial and populated centers of England, Germany, France, America and other countries, that "New York streets are the dirtiest on earth," we can not but help rise up and ask, in the name of all that is municipal, why this should be. Dr. Shadwell has, perhaps, caught New York unawares—say a week or two after, a snowstorm—when, although the main avenues are tolerably well cleaned up, he may have wandered into some of the side streets, West Twenty-seventh street, for instance, the short patch between Broadway and Sixth avenue. He most likely noted there the accumulation of dirty snow, filth, offal, unemptied garbage cans and similar miscellaneous what-nots and trifles that help so much to make a city odorful, and which fragment of byway was choked up recently for fourteen clear days after the last snowfall. We could, ourselves, draw the authorities' attention to many other titbits of thoroughfare similarly ill-conditioned. There is no question about it, New York City has much to learn in regard to street cleaning. Its "wash-up" is eccentric and ill-defined and the impression made on the average visitor, let alone the specialist, is from middling to bad. We can, therefore, hardly feel surprised at being called names.

Awakening in Other Countries

PRACTICALLY there is no limitation to the field of public work. Cuba, awakening from a prolonged slumber under Spanish rule, gives sign of energy undeveloped, well directed toward improvements; Mexico follows after; Chili falls into line with harbor plans, already complete, involving millions expenditure, and other neighboring countries see the dawn of a new era. After sitting through seventy-five years in the Yturbide Theater, the Mexican Congress promises better things—better things for the City of Mexico, better things for the country—a new régime, marked by internal improvement. The old is to be vigorously shaken off, the new assiduously dealt with. Welcome news is it which tells of approval of the plans for building a Capitol in the City of Mexico. The structure will cost $15,000,000, and will be fashioned after the Capitol building at Washington. Located on the Paseo de la Reforma, the new Capitol will stand face to face with the famed Castle of Chapultepec.

Experts Report on Foundation

THE committee of distinguished engineers who were called to Cleveland, Ohio, to give their opinion as to the proper foundation for the new Courthouse have made their report. The Board consisted of John F. Wallace, William Sooy Smith, and Walter P. Rice; their report, adverse to the concrete piling foundation recommended by the architects, favors the spread foundation type in general use in that city for supporting large buildings. They recommend that three feet of sand remain or be provided under the foundations and over the clay bed; that a comprehensive system of subdrainage be provided; that all surfaces between the building and the lower ground where railroad tracks lie shall be rendered impervious to water. These conditions complied with, a load limit not to exceed 2½ tons to the square foot will, according to the experts, make a satisfactory foundation.

How It Luks, Mr. Karnege

MUNISIPL ofishuls, Mistr Andru, r going 2 b gratle disterbed if ur plan ov impruvd speling iz likle 2 b carid out and asoom definit shape. The methud, Sur, if adopted, wil plas them al in an independunt posishun bi enabling them 2 rite as thay ples. It wil bother the editors a gud deel and the publik all the time. Tho the man who spels pig with 2 jees wil be maid hapy whilst skool children wil rize up and kall u blessed. It wil kost u an orful lot ov munny 2 karry out the skeem thoroly, but u wont mind that. Wen it kums 2 teknikel tirms that iz ware u wil get in ur fine wurk. Worter, Soorij, Njneering, Publik Helth, Rode-making, Street Kleening, Liting, Sity's Waist, Muskeeto Xterminashun, Raleway Franshises, Kontrol ov Krime, Sivik Muvments, etseterer, r the wurds that wil natchurly pleeze ower staf and mak Artemus Wards ov all ov us.

New York State Lighting Commission

A QUESTION which has been mooted on more than one occasion before the newly-created New York State Commission on Gas and Electricity has been settled once and for all by the Attorney-General's office. An opinion prepared by Deputy Attorney-General Ainsworth holds that upon application of a corporation to the Commission for a certificate of authority to transact business, the Commission need not permit the legality of the consent granted by the municipality to the corporation to be attacked. The question came up on the application of the Citizens' Lighting Company of Oswego, which corporation was opposed by the Peoples' Gas and Electric Company. Among the questions raised were those as to whether the members of the Council which granted the consent were legally members thereof, and had taken their oath of office; whether a majority of the abutting property owners had given their consent, and had been properly acknowledged, and whether any of them had been revoked prior to the presentation of the same to the Council, and other questions of a like nature. These are all collateral questions, according to the Attorney-General, and the duty of deciding them devolved upon the Common Council of the city. The Commission has imposed upon it a distinct, specific and important duty; it has a jurisdiction possessed by no court, and should confine its inquiries to those matters for which it was especially created. The courts were established for the

trial of such questions, and they have the same jurisdiction now as they had before the creation of the Commission.

Object Lesson to Firemen

In respect to the disastrous fire in San Francisco, following the earthquake, which cost thousands of lives, did irreparable damage to property and made hundreds of thousands homeless, there is one feature of the catastrophe which should be studied. That it will be, especially by Fire Department officials throughout the United States, if not, indeed, throughout the entire world, goes without saying. Could not the conflagration have been stopped before the flames succeeded in licking out so many costly business blocks and handsome residences? The water mains were rent asunder by the upheaval, thus rendering the fire-fighting force helpless, and the use of dynamite was resorted to as a preventive against the fiery onslaught; this did little good, just as was the case in Baltimore at the great fire two years ago. In fact, Chief Engineer Horton, of the Monumental City, who so capably superintended the workings of the departments from various cities at the time of the Baltimore visitation, claims that, instead of helping to allay the flames, the razing of sound buildings assisted materially in causing them to spread. He is unalterably opposed to the use of dynamite, and points out that there is a difference between fighting a prairie fire and fighting a fire in a built-up city. Trenches are dug to impede the progress of the flames in a prairie or wood fire. On the same principle buildings are razed in a big city. But a trench cannot burn. Debris will. If the flames cannot leap the chasm of fallen buildings, they rush onward through the ruins. And, is it not plausible that a large, substantial building will act as a shield to stay the flames? San Francisco was not benefited by dynamite; Baltimore surely was not, and the experience of other cities where conflagrations have been experienced in recent years has undoubtedly been the same. Is it not possible, or even probable, that there will be some change in the mode of fighting big fires?

Municipal "Muck-Rakers"

President Roosevelt, with his habitual strenuousness, has stamped a vigorous disapproval of the "Muck-Rakers" and Mr. Secretary Taft has somewhat weightily followed him by a timely denunciation of that same class of unoptimistic individuals who seem to delight in the indulgence of garbage-raised anathemas and arraignments of prominent persons and officials. There is dirt anywhere if it is only diligently sought for—no less in the streets than in assemblies and Council chambers. Public men, however, are getting tired of being pilloried by enterprising magazine proprietors and the prurient of the press. As a body, such men are fully entitled to every consideration a not-always appreciative citizen can give them. They, as a rule, do their utmost with the brains they are blessed with and the material at their disposal, and it redounds greatly to the credit of those of the official classes of the country that they perform their duties, take it altogether, honestly, fearlessly and well, though oftentimes on salaries and with rewards that are as ridiculous pittances when compared with the amount of work they have to undertake and the salaries of men engaged in commercial pursuits can obtain. The wrong-doers among them are generally pretty quickly picked out, pinned to the wall, and put into positions of unenviable personal notoriety. Civic officers are particularly subject to treatment of this kind by all sorts of pessimistic "would-bes" and indefinite irresponsible hangers-on, whose peanut minds will not permit them to look at the better side of a man's nature, ambitions or actions. The Mayor of New York City, as an instance, has been pilloried and fulminated against to an extent that raises the gorge in the breast of every decent-minded man. The worst of it is, his position will not allow him, with any due regard for the dignity of his office, to reply to the almost constant venomous and ill-grounded attacks upon him. Thus it is all down the line in almost every city and town in the United States—erratic abuse and unjust criticism are employed. It is therefore a treat to find a man like the President with a big stick reducing this irrelevant army of snappers to something like submission, though we fear his efforts will be likened unto those of a man chasing mosquitoes with a baseball bat. Someone wrote once, "Though I walk on the earth may I not forget the uses of the stars." Would it not be as well if the "Muck-Rakers" would occasionally lift their eyes off the ground and get a glint of the gleaming sunshine?

America's Richest Town

According to the annual report of the assessors of the town of Brookline, Mass., which boasts of being the wealthiest in this country, if not in the world, the assessed valuation of real estate was $63,095,900, and the valuation of personal property, $27,756,500, making a total of $90,852,400. This is over $2,000,000 greater than the preceding year, while the rate was placed at $12 per $1,000, against $10.50 the previous year. The valuation of property owned by the town is $6,015,659. Two women pay the largest tax, the estate of Henrietta S. Sargent paying $13,449.69 on $450,000 personal property and $670,800 real estate; while Mrs. Mary B. Brandegee, wife of Edward D. Brandegee, and one of the richest women in America, pays a tax of $13,096.80 on $291,400 real estate and $800,000 personal property, the highest assessed personal estate in Brookline. Julia Coolidge also stands well at the head of the list, paying $9,132 on a $400,000 personal estate and $361,000 real estate.

Charters for New York Cities

Rochester officials are making a determined fight against some of the provisions of the uniform charter bill for second-class cities, presented in the New York Legislature by Senator White. Objection is made particularly to the setting aside of 30 per cent. of the tax budget as a sinking fund, and to the provision permitting a taxpayer to apply for the setting aside of a local improve-

ment assessment at any time, instead of within twenty days of the confirmation of the roll and before the work is done, as under the existing charter. A bill exempting Rochester from many of the provisions of the new charter has been prepared by the Law Department of the city, and Corporation Counsel Webb has held conferences with Senators White and Lewis of the Cities Committee, Corporation Counsel Andrews of Albany and other charter experts without avail. It is contended that Rochester is not in the same class as cities like Yonkers, being three times as large. Senator White holds that the constitution provides that all cities of more than 50,000 population, and not more than 250,000, shall be second-class cities, and that they shall be governed under a uniform charter. A constitutional amendment, he says, will be necessary to grant the demands of Rochester.

Scheme for Abating Smoke

SMOKE INSPECTOR KRAUSE, of Cleveland, Ohio, who has made a study of the subject, has some advanced ideas regarding a matter which has become of vital importance to municipalities throughout the country. He ridicules the gigantic scheme engineered by Messrs. Charles M. Schwab, Francis L. Robbins, Henry Phipps, Andrew Carnegie, W. E. Corey, H. C. Frick, and others, for the abatement of the nuisance in Pittsburg. They plan to supply the city with electric power generated at the coal mines. Mr. Krause says the scheme might be profitable, but not feasible, as the nuisance in the "Smoky City" is general, and no effort has been made to abate it. Mr. Krause advocates the establishment of large heating, lighting, and power plants in the center of cities. It is the small factory, and not the large plants so much, that emit smoke, he said, as it costs too much for these small concerns to make use of smoke consumers. Their boilers are too small, and the consumer cannot be worked properly to make any saving in the coal. When the centralized method of heating, lighting, and furnishing power comes into use, and it is expected to be quite general in ten or fifteen years, Mr. Krause said, the smoke evil will be practically unknown in cities where it is applied.

A Big Leakage

THE New York Central Railroad will have to give an explanation to the city, and most likely a considerable sum of money as well. Fifteen hydrants in the company's yards, from Fifty-ninth to Seventieth Streets, on Twelfth Avenue, have, for a score of years, been drawn upon without the necessary corollary of meter registration. Four hydrants on Pier 89 at Fifty-ninth Street, North River, have been made use of in the same manner. At this particular point nine tugs and two floats watered in one morning. In addition to these things, another hydrant was found by the inspectors to be open, and had evidently been running all night into the adjacent river. Still further a hydrant and hose were being used at Fifty-sixth street to fill three hundred barrels with water, while various other things of a like kind, the details of which, fully illustrated with photographs, will, in course of time, be duly presented in proper legal folio form to the requisite court called upon to decide upon the right payments to be made for this outrageous series of misservice. It actually looks as though the New York Central Railroad will have to pay up. The city will surely be the richer for the discovery. It is, perhaps, hardly necessary to add that if that is the sort of money that has to be collected, Mr. Commissioner Ellison is the sort of man to collect it.

Compulsory Education for Laborers

All the way from Stuttgart (Germany) comes the news that the Landtag of Wurttemberg is favorably considering a bill recently introduced in that assembly providing for the compulsory education of laborers. It appears to be a drastic as well as a thoroughly practical measure. Every community, the bill goes on to state, having at least 40 male laborers under eighteen years of age, must establish a commercial and trade school and compel the attendance, for three years, of these youths. Separate schools under the same conditions are to be instituted for girls. The smaller places, where there are not 40 working youths, the government comes to the assistance of and will, at its discretion, establish suitable schools. Nevertheless, all the schools are to be under the supervision of the government and when it is found that financial aid is necessary, the government will render it. In this way, both the community and the government hope to do away with that dreg of and drain upon every small place, viz., the unoccupied youth. The young village hoodlum's occupation will be gone. He will have to work, and where the parental influence is not strong enough to compel him to do this, the community and government will step in and make things lively for him. That no boy under seventeen years of age shall enter saloons is a further provision of a bill destined to work well in a country where there are a large number of thinly populated districts out of the reach or ken of the large cities. The results of such an innovation will be watched with marked interest by the rural portions of the rest of the world, who have always had considerable difficulty in dealing with the immature loafer.

Portland's Good Showing

PORTLAND, OREGON, is no exception to the general rule of successful municipal management of waterworks. Earning a profit in the past sufficient to pay operating expenses, sinking fund and interest charges, and 3.7 per cent. on its total investment, the Water Department is in a good financial position for making extensions that a rapidly growing population requires. The water is taken from the Bull Run River, thirty-one miles from the city, whose sources in the snow cap of Mt. Hood furnish a supply unsurpassed in purity. At the present time a 24-inch main is being laid from the Mt. Tabor reservoir, seven and one-half miles from the city limits, which will complete the high-pressure system of the forty miles of city area

DIARY OF COMING MUNICIPAL BOND OFFERINGS.

DATE	TIME	AMOUNT	Denomination.	Int. Rate	Matures Years	PLACE	STATE	PURPOSE	OFFICIAL AND ADDRESS
May 2.	*8 p.m.*	16,500.00	.....	4 s.a.	13	LORAIN.....	OHIO.....	School.....	E. E. Hopkins, Clerk.
" "	*8 p.m.*	50,000.00	1000	4 s.a.	5–30	MAMO'NECK	N. Y.....	Sewer.....	C. W. Buckter, Clerk.
" "	*8 p.m.*	35,000.00	.....	4½s.a.	19¾	E. PITTSF'D.	PENN'A...	School.....	C. F. Bell, Auditor.
" "	*7.30 p.m.*	15,000.00	.....	4½s.a.	13	SPR. LAKE..	MICH.....	.....	Village Clerk.
" "	*12 m.*	20,000.00	.....	4½s.a.	3½	STEUBEN'LE	OHIO.....	Garbage Pl'nt	F. S. King, City Aud.
" "	*9 a.m.*	17,000.00	500	5 a.	29	EDGWOOD...	W. VA....	Improvement	Chas. B. Hart, Com'r.
" *3*	*12 m.*	400,000.00	.....	4	1–15	DENVER....	COL.....	Au'd In.....	R. W. Speer, Mayor.
" *4.*	.....	20,000.00	.....	5 s.a.	15	CUSTER.....	S. D.....	Refunding...	W. A. Nevin, Aud.
" "	*10 a.m.*	70,000.00	.....	4 s.a.	9	COLUMBUS..	OHIO.....	Improvement	Secretary, S. F.
" "	*10 a.m.*	60,000.00	.....	4½	9½	"	"	"	" " "
" "	*10 a.m.*	50,000.00	.....	4½	9½	"	"	"	" " "
" "	*10 a.m.*	100,000.00	.....	4	10	"	"	"	" " "
" "	*10 a.m.*	125,000.00	.....	4	19	"	"	"	" " "
" "	.....	40,000.00	.....	4	30	NORFOLK...	"	Sewer.....	J. Hoff, City Clerk.
" *7.*	*12 m.*	15,000.00	.....	4 s.a.	8	NEWARK....	"	School Dis...	D. M. Kellar, Clerk.
" "	*12 m.*	32,425.00	.....	Bid.	1–5	CANTON.....	"	Improvement	A. Ashbrook, Aud.
" "	*12 m.*	11,900.00	.....	Bid.	5	CANTON.....	"	Refunding...	A. Ashbrook, Aud.
" "	*12 m.*	425,000.00	.....	3½s.a.	.....	CINCINNATI.	"	Viaduct.....	W. T. Perkins, Aud.
" "	*12 m.*	1,130,000.00	.....	5	.....	CLEVELAND.	"	Improvement	J. P. Madigan, Aud.
" "	*3 p.m.*	50,000.00	.....	5	5–40	LECKPORT...	TEX.....	Street.....	J. B. Hatchett, Secy.
" "	*12 m.*	26,000.00	.....	4½s.a.	20	CONNEAUT..	OHIO.....	Park.....	H. T. Culp, Aud.
" "	*1 p.m.*	11,000.00	.....	Bid.	10–20	WAITSBURG.	WASH.	Sewer.....	C. E. Bateman, Clerk.
" "	*7 p.m.*	50,500.00	.....	5 s.a.	1–10	YOUNGST'N..	OHIO.....	Improvement	W. I. Davies, Aud.
" "	*7 p.m.*	2,500.00	.....	5 s.a.	1–2	YOUNGST'N..	OHIO.....	Sewer.....	W. I. Davies, Aud.
" "	*7 p.m.*	28,000.00	.....	5 s.a.	1–5	YOUNGST'N..	OHIO.....	Sewer.....	W. I. Davies, Aud.
" "	*7 p.m.*	600.00	.....	6 s.a.	1	YOUNGST'N..	OHIO.....	Improvement	W. I. Davies, Aud.
" *8.*	*8.30 p.m.*	50,000.00	.....	6 s.a.	10–12	ARTESIA....	N. M.....	Water.....	J. E. Swepston, C. Cl'k.
" "	*4 p.m.*	26,000.00	.....	Bid.	15	TONAWANDA	N. Y.....	.....	L. H. Hollister, Buffao
" "	*8 p.m.*	15,000.00	.....	5 a.	20	CROOKSTON.	MINN.....	Fire Dep't....	A. M. Childs, Clerk.
" *10.*	*12 m.*	20,000.00	.....	5 s.a.	5–20	N. PLATTE..	NEB.....	Irrigation....	Board of Directors.
" "	.....	22,000.00	.....	4 s.a.	10–20	UNION.....	OHIO.....	School.....	Clerk Board of Educa'n
" "	*12 m.*	200,000.00	1000	4 a.	30	MEMPHIS....	TENN.....	Water.....	M. Douglass, C. Reg.
" *11.*	*7.30 p.m.*	30,000.00	.....	4 a.	20	MADISON....	WIS.....	School.....	O. S. Norsman, Clerk.
" *12.*	*12 m.*	5,000.00	.....	4 s.a.	12–15	AUBURN....	OHIO.....	Rd. imp'nt...	Chas. McConnell.
" "	*12 m.*	5,000.00	.....	4 s.a.	10	LANCASTER..	OHIO.....	.....	H. T. Mechling, Aud.
" "	*12 m.*	4,000.00	.....	4 a.	14	CALDWELL..	OHIO.....	Water.....	Village Clerk.
" "	*3 p.m.*	30,000.00	.....	5 s.a.	10–20	WHITEFISH..	MONT....	Water.....	Percy F. Woods, Clerk.
" *14.*	.....	5,000.00	.....	.....	.....	COMFREY...	MINN.....	Water.....	W. B. Brooks, Rec'r.
" "	.....	200,000.00	.....	3½s.a.	20	CINCINNATI.	OHIO.....	.....	Wm. Gratman, Clerk.
" "	*12 m.*	52,000.00	.....	6 a.	1–20	YREKA.....	CAL.....	Road.....	J. E. Wheeler, Treas.
" "	*12 m.*	150,000.00	.....	5 s.a.	3–20	SELMA.....	ALA.....	Water.....	V. B. Atkins, Mayor.
" "	*8 p.m.*	20,000.00	.....	Bid..	10–20	WAMPA.....	IDAHO....	School.....	B. B. Kurtz, Clerk.
" *15.*	*8 p.m.*	21,000.00	.....	4 s.a.	10–20	COLO. CITY..	COLO.....	School.....	F. F. Schreiber, Secy.
" "	.....	20,000.00	.....	.....	30	TUSKEGEE..	ALA.....	Sewer.....	O. S. Lewis, Mayor.
" "	*8 p.m.*	50,000.00	.....	4 s.a.	21–30	MT. VERNON	N. Y.....	Building.....	E. F. Brush, Mayor.
" "	*8 p.m.*	20,000.00	.....	4 s.a.	20	MT. VERNON	N. Y.....	Bridge.....	E. F. Brush, Mayor.
" "	*2 p.m.*	76,000.00	.....	4 s.a.	1–19	COOPERST'N.	N. Y.....	School.....	Board Trustees.
" "	*10 a.m.*	20,000.00	1000	5 s.a.	20	BELLEVILLE	KAN.....	Electric L't..	J. B. Peach, Clerk.
" "	*5 p.m.*	60,000.00	.....	4 s.a.	12½	N'TH PLA'TE	NEB.....	Water.....	C. Samelson, Clerk.
" "	.....	5,500.00	500	4 a.	6	LEETONIA...	OHIO.....	Water Supply	Jacob Kuegle, Clerk.
" *16.*	*12 m.*	200,000.00	.....	5 s.a.	16	LIVE OAK...	FLA.....	Improvement	Bd. of Bond, Trustees.
" *17.*	.....	5,000.00	500	4 s.a.	5	FINDLAY....	OHIO.....	Park.....	Wm. Demland, Aud.
" "	.....	200,000.00	.....	4	30	MINN'APOLIS	.....	School.....	D. C. Brown, Compt.
" *19.*	*12 m.*	12,000.00	600	4	5¾	DOVER.....	OHIO.....	Improvement	The Mayor
Any date.	.....	22,000.00	.....	4	27	EVERETT....	MASS.....	Drainage.....	City Treasurer.
May 19.	.....	12,000.00	600	4 s.a.	.....	CAN'L DOV'R	OHIO.....	Improvement	J. F. Deffenbacher, A'r.
" *21.*	.....	350,000.00	.....	.....	.....	CLEVELAND.	OHIO.....	School.....	Secy. Bd. of Educa'on.
" *24.*	.....	10,000.00	.....	.....	.....	BELLAIRE...	OHIO.....	Refunding...	F. A. Jackson, Aud.
" "	.....	7,666.23	.....	.....	.....	BELLAIRE...	OHIO.....	Expense.....	F. A. Jackson, Sec. S.F.
" *28.*	.....	2,150,000.00	.....	.....	.....	CLEVELAND.	OHIO.....	Improvement	J. P. Maddigan, Aud.
June 1.	*12 m.*	5,000.00	.....	.....	.....	COURTLAND.	VA.....	School.....	W. J. Sebrell, Mayor.
" *26.*	*6 p.m.*	25,000.00	.....	5 s.a.	1–25	VACARILLE..	CAL.....	Sewer.....	E. W. Manual, T'n C'k.

INCORPORATIONS

ARKANSAS

The Junction City Light and Water Company; capital, $10,000. Incorporators: W. V. Brown and others.

The Blytheville, Burdette and Mississippi Railroad Company; capital, $240,000. Directors: W. A. Gilchrist, M. B. Cooper, A. H. Hardy and others.

COLORADO

The Institute Electric Company; capital, $1,000,000. Incorporators: Charles Ruffner, A. L. Woodhouse and others.

The Argentine Electric Light and Power Company; capital, $100,000. Incorporators: W. B. Le Wall, J. H. Meyers and others.

KANSAS

Southeastern Kansas Railway, Light and Power Company. Incorporators: L. Rosenthal, J. J. Jones, Frank Dixon, of Kansas City.

LOUISIANA

Watson Electrical Supply Company; capital, $5,000. Incorporators: J. M. Watson, N. C. Evans, M. M. Jones, of Shreveport.

MAINE

Consolidated Street Lighting Company; to deal in street lamps, etc.; capital, $1,000,000. Incorporators: President, H. C. Wilbur; treasurer, H. L. Cram; clerk, Frederick Hale, all of Portland.

Maine Light, Heat and Power Company; to deal in gas-producing machines; capital, $250,000. Incorporators: President, P. J. Deering; treasurer, N. M. Marshall; clerk, S. W. Peregrine, all of Portland.

MASSACHUSETTS

Miracle Pressed-Stone Company; to deal in concrete blocks for building purposes, etc.; capital, $10,000. Incorporators: President, William J. Hennessey, Dorchester, Mass.; treasurer, E. Bertram Newton, Hotel Vendome, Boston; clerk, Albert W. Cobb, No. 14 Temple avenue, Winthrop, Mass.

MARYLAND

Greencastle and Mercersburg Railway Company; capital, $500,000. Incorporators: T. M. Nelson, president; Geo. B. Beaver, vice-president; A. N. Pomeroy, vice-president; H. B. McNulty, secretary, Jos. Siever, treasurer.

Progressive Homestead and Building Association; capital, $1,000,000. Incorporators: James D. Hull, Enoch Harlan, Thomas B. Hull, Charles R. Woods and Perley E. Sands.

MINNESOTA

The Beltrami Electric Light and Power Company; capital, $50,000. Incorporators: W. G. Schroeder, W. C. Warfield and others.

The Akaley Telephone Company; capital, $15,000. Incorporators: H. H. Thomas, Amos Thomas, H. H. Johnson, Robert Dulin, H. I. Davis, L. M. Thomas.

MISSOURI

The Joplin Electric Supply and Construction Company. Incorporators: W. L. Butts, A. S. Foster and A. F. Hadden.

NEW YORK

New York and Ontario Power Company; electric light, heat and power, etc.; capital, $2,000,000. Incorporators :David J. Crichton, John W. Liston and William F. Burt, all of Ogdensburg, N. Y.

Otselic Valley Telephone Co., Cincinnatus, Cortland county; capital, $10,000. Directors: J. H. Murray, P. C. Wheeler, F. M. Davis, Cincinnatus.

National Helmet Co.; manufacture helmets, head protection, fire equipments, etc.; capital, $15,000. Incorporators: Alfred E. Davidson, No. 151 West 143d Street; William C. Naroth, No. 195 Water Street, New York; George F. Trommer, No. 1632 Bushwick Avenue, Brooklyn.

Pfeifer Bros., Inc.; to manufacture metal cornices, skylights, etc.; capital, $3,000. Incorporators: Herman Pfeifer, No. 5314 Hudson Boulevard, North Bergen, N. J.; William Pfeifer, No. 38 Sherman Place, Jersey City; Ferdinand Aue, No. 208 East 60th Street, New York.

Jewesson & Baldwin Company; to manufacture and furnish electric apparatus; capital, $10,000. Incorporators: William R. Jewesson, No. 1540 57th street; Harry F. Stoffragen, No. 351 57th street, both of Brooklyn; David M. Baldwin, No. 139 North Center street, Orange, N. J.

Metropolitan Audit Company; accountants and appraisers; capital, $30,000. Incorporators: Franklin Q. Brown, No. 41 Wall street; Frederick L. Eldridge, No. 66 Broadway; Cornelius C. Cuyler, No. 44 Pine street; J. E. Grate Higgens, No. 60 Beaver street; Henry W. Waterworth and H. Bond King, No. 82 Beaver street, all of New York.

Rensselaer Brick Co.; to manufacture and deal in brick, stone, etc.; capital, $25,000. Incorporators: Cornelius J. Smith, Robert H. Rollins and Horner L. Brayton, all of Rensselaer, N. Y.; Geo. J. Hatt, 2d Albany, N. Y.

Westview Construction Company, Brooklyn; real estate; capital, $700,000. Directors: G. E. Manwaring, A. H. Muller, G. S. Fulton, New York.

Interstate Gaslight Company; to manufacture gas machines and gas fixtures; capital, $75,000. Incorporators: Samuel S. Poole, Albany, N. Y.; Samuel H. Hellen, Melrose, Mass.; Ernest W. Riecks, Albany, N. Y.; Joseph Hellen, Somerville, Mass.

E. Spencer Hall & Company, New York; house decoration; capital, $200,000. Incorporators: P. V. C. Miller, A. W. Lord, New York; E. S. Hall, Water Witch, N. J.

Buffalo Radiator Company; to manufacture radiators, boilers, furnaces, etc.; capital, $150,000. Incorporators: Whitney G. Case, Joseph P. Fell, Henry M. Poole and Fred A. Mason.

Allis-Watson Company; electricians, mechanical engineers, etc.; capital, $15,000. Incorporators: Louis Allis and T. S. Watson, Milwaukee, Wis.; Eustace Conway, No. 15 William street; John Richmond, No. 39 Cortlandt street, both of New York; F. H. Petrie and Mechanical Appliance Co., Milwaukee, Wis.

Auburn Construction Company; to deal in building materials, coal, wood, etc.; capital, $20,000. Incorporators: Reginald Halladay, Walter L. Fairchild and Harold L. Ward, all of No. 35 Wall street, New York.

NEW JERSEY

Lawrence Engineering Company, No. 119 Market street, Camden, N. J.; electricians, mechanical engineers, etc.; capital, $150,000. Incorporators: Augustine N. Lawrence, No. 16 St. Paul's Road, Ardmore, Pa.; Benjamin Baseler, No. 43 North Tenth street, Philadelphia, Pa.; Stephen Barker, No. 303 West 71st street, New York.

Canton Bridge Company, No. 15 Exchange Place, Jersey City; to construct bridges, machinery, slips, engines, cars, etc.; capital, $25,000. Incorporators: John R. Turner, as above; Peter L. McGrail and Grove E. Johnson, Groton, N. Y.

Bloomsburg Water Company, No. 109 North Avenue, Plainfield, N. J.; to operate waterworks in the borough of Bloomsburg; capital, $25,000. Incorporators: John A. Staas, John F. Auten, Henry C. Van Ernburg, Clarence E. Teel, Ellsworth C. Westcott and Edward F. Newton, all of Plainfield, N. J.; John De Hart, Bloomsburg, N. J.

NORTH CAROLINA

Greensboro Construction Company; capital, $25,000. Incorporators: Thos. Williams and others.

The North Carolina Electric Company. Incorporators: Dee Allen and Daniel R. Griswold, of Candor, N. C., and Werlie C. Hard, of Philadelphia, Pa.

OHIO

The Wheatland Street Railway Company. Incorporators: Randall Montgomery, M. C. McCaskey, W. T. Burns, S. C. Rodgers, of Youngstown; Charles Beckman, of Sharon.

The Northern Light Company; capital, $10,000. Incorporators: E. M. Cloves, R. S. McConnell and Samuel Kleinman.

OKLAHOMA

Enid Street Railway Company. J. M. White, incorporator.

The Shattuck Electric Light and Power Company. Incorporators: W. G. Shears, R. A. Moody and J. W. Ewing. Capital stock, $3,000.

PENNSYLVANIA

The Ligonier Street Railway Company; capital, $60,000. J. H. Williams, president.

Pittsburg Subway Company; capital, $50,000. Incorporators: Horace F. Bahn, president, Coleman E. Audel, Edwin K. Morse, Hugh H. Lyon, Harrison M. Williamson, directors.

SOUTH CAROLINA

Sumpter Light and Power Company; capital, $80,000. Incorporators: Marion Moise, G. E. Ladshaw and F. T. Bryant.

SOUTH DAKOTA

Brookings and Sioux City Railway Company; capital, $100,000. Incorporators: Neil Stewart and others.

WASHINGTON

The Northern Electric Company; capital, $30,000. Incorporators: A. M. Winston, M. A. Folsom and A. H. Featherstine.

TEXAS

Union Construction Company; capital, $500,000. Incorporators: J. M. Carter and others, of Dallas.

The Galveston Toll Bridge and Causeway Company. Incorporators: O. F. Holt, F. L. Dana, Charles Clark and others. To build a toll bridge and causeway from Virginia Point to Galveston.

Big Valley Irrigation Company; capital, $24,000. Will operate at Barstow.

TENNESSEE

Hohenwald Telephone Company. Incorporators: C. D. Loveless, president, and J. F. Whitwell, secretary.

WASHINGTON

Walla Walla Traction Company; capital, $3,500,000. Incorporators: Niles C. Moore, F. W. Paine and W. W. Baker.

Gray's Harbor Railway and Lighting Company; capital, $500,000. Incorporators: George F. Soute and others.

PATENT CLAIMS

817,797.—STRAINER FOR AIR-COMPRESSORS. William J. Ogan, Dayton, Ohio. Filed Feb. 1, 1906. Serial No. 298,908.

A strainer for air-compressors, comprising a screw-threaded apertured base A with yoke D extending from its upper side and spanning the aperture concentrically-disposed, screen-cylinders E and J mounted upon said base portion and inclosed at their upper ends by a cap G, a stem C projected from the yoke D and penetrating a central aperture in the cap, said stem being provided with a nut which tightens the cap against the screen-cylinders, said screen-cylinders providing a chamber concentric therewith and lying on the outer side of the aperture in the base, a filtering medium inclosed within said chamber, and a shield inclosing said strainer and held in position by the nut which tightens the cap against the screen-cylinders.

817,849.—PROCESS OF FUMIGATING PLANTS. Robert Hand, East Cleveland, Ohio. Filed June 13, 1904. Serial No. 212,441.

The herein-described process of fumigating greenhouses, which consists in exposing vaporizable liquid insecticide, in a thin layer, to the action of a stream of superheated steam flowing through a suitable conduit, whereby the insecticide is vaporized and its vapor is taken up and carried along by said superheated steam, and of discharging said superheated steam, laden with the vaporized insecticide, into the atmosphere of the greenhouses, substantially as and for the purpose specified.

817,904.—FLOATING BREAKWATER. Thomas D. Cook, Glendon-Torquay, England. Filed July 17, 1905. Serial No. 270,127.

A floating breakwater, comprising in combination, floating frames, moorings attached at the lower ends of said frames, and floating means attached at the upper ends of said frames, at one side thereof as set forth.

817,940.—INCLINED RAILWAY. William H. Strickler, Chicago, Ill., assignor to Federal Construction Company, Chicago, Ill., a corporation of Illinois. Filed Oct. 25, 1905. Serial No. 284,369.

In a device of the class described a combination with a car and a traction-chain having a shoulder thereon, of a dog pivotally supported at its forward end to the car and at its rear end adapted to engage the said shoulder, the length of the dog being greater than the normal distance between its pivot and the chain, substantially as described.

817,964.—MACHINE FOR MAKING CEMENT BLOCKS AND THE LIKE. Willard P. Elmore, Adrian, Mich. Filed Feb. 27, 1905. Serial No. 247,460.

The combination with a pressure-chamber, comprising laterally-movable side and end walls, means for moving the same simultaneously in and out, a top comprising separable portions, a bottom, and a vertically-reciprocating carriage for carrying the same, means for shifting the separable portions of said top, means for moving said side and end walls in and out, and means for reciprocating said carriage, said mechanism being arranged to begin the downward reciprocation of the carriage shortly after the pressure-walls begin to move outwardly.

817,988.—MANUFACTURE OF BRICK. Gust A. Riddle, Pittsburg, Pa., assignor of two-thirds to J. W. Fritts and C. J. Mathewson, Pittsburg, Pa. Filed Dec. 17, 1904. Serial No. 237,313.

The herein-described composition of matter for the manufacture of brick, consisting of ground or pulverized ganister stone, silicate of soda, water and glycerin, in or about the proportions stated.

817,990.—PROCESS OF BURNING FUEL AND OTHER MATERIALS. Anthony M. Robeson, Johannesburg, Transvaal, and Claude A. Bettington, Boston, Mass. Filed Apr. 13, 1905. Serial No. 255,471.

The process of combustion which consists in injecting a fuel into a combustion-chamber, igniting the same, and causing the products of combusion and any unconsumed particles thereof to double back and envelop the incoming fuel.

817,996.—APPARATUS FOR TREATING SEWAGE. Martin Van Buren Smith, New York, N. Y. Filed Aug. 18, 1905. Serial No. 274,648.

In an apparatus for separating liquids from solids, the combination with a traveling apron or conveyor constructed of a material impervious to water having interstices so fine as to prevent water under normal conditions from passing therethrough, of means engaging the under surface of the apron or conveyor for drawing water through the apron and discharging it.

818,158.—MACHINE FOR MANUFACTURING PIPES OR CONDUITS FROM CEMENT, ETC. Claude Girardot, Vitry-Le-François, France, assignor to Société J. et a Pavin de Lafarge, Viviers, France. Filed Jan. 3, 1905. Serial No. 239,509.

A molding-machine of the class described, comprising a rotary table, a mold mounted on said table comprising a casing and a core, a shaft carrying said core and extending through the latter and being detachably connected to said table for rotating the same, a platform loosely mounted on said shaft, ramming mechanism carried by said platform, a gage carried by said platform for adjusting the height thereof in accordance with the height of the material in the mold, and means carried by said shaft for expanding and contracting the core.

818,026.—DUST DEFLECTOR AND CATCHER FOR RADIATORS. Rollyn Hawkins, Indianapolis, Ind. Filed Feb. 7, 1905. Serial No. 244,610.

In a dust-catcher for radiators, an upwardly and forwardly sloping hood having an under-side dust-catching pocket along its front edge, and an apron hinged to the rear of said hood, said apron being adjustable at its lower edge to or from the radiator.

818,165.—VOTING MACHINE. Charles F. Harrington, Lyndhurst, N. J., assignor to The Dial Voting Machine Company, Lyndhurst, N. J., a Corporation of New Jersey. Filed Oct. 10, 1904. Serial No. 227,800.

In a voting-machine, a horizontally-disposed circular casing having an annular slot and carrying a plurality of names or other identifying symbols of candidates to be voted for, a registering mechanism for each of such names, an actuator loosely mounted on a vertical center in said casing and having a portion extending radially through said slot to the exterior of said casing, whereby said actuator may be swung horizontally to a selected name and into operable relation to the registering mechanism therefor, and means for simultaneously moving said registering mechanisms vertically relatively to said actuator to operate the registering mechanism for the selected name by contact with said actuator.

818,197.—ADVERTISING DEVICE. Hercules A. de Rudio, Los Angeles, Cal. Filed May 10, 1905. Serial No. 259,785.

In a device of the class described in combination, a guide presenting a groove with a contracted opening, a chain adapted to move in said groove and having a transverse bar projecting upwardly through said contracted opening, and means for attaching advertising matter to said chain.

818,215.—EXCAVATOR. August M. Anderson, Moorhead, Minn. Filed May 11, 1905. Serial No. 259,862.

In an excavator in combination, a wheel having teeth, means for rotating said wheel upon a substantially horizontal axis, said wheel being formed in separated sections, a driving-chain passing into the space between the said sections and affording means for rotating said wheel, and means for driving said chain from a point behind said wheel.

818,241.—MAIL COLLECTION AND DELIVERY BOX. John I. Fullwood, Cedartown, Ga. Filed Aug. 3, 1905. Serial No. 272,507.

A supporting-frame for a mail-box, comprising duplicate standards having vertical extensions, and lateral wings on upper ends of said extensions, said wings being securable on the bottom of a mail-box mounted thereon.

818,264.—FILTER. Gottlob Klumpp, Brooklyn, N. Y. Filed Oct. 24, 1904. Serial No. 229,801.

In a filter, the combination with a casing designed to contain a filtering material, said casing having a neck at its upper, and a discharge-opening at its lower end, of a cap connected to the neck, a perforated cylinder arranged in the casing and having a tube extending into the discharge-opening and a tube projecting from the top which extends into the casing, a disk arranged in the neck of the casing and means carried by the cap and tube for closing the tube connected to the lower end of the cylinder for the purpose specified.

818,272.—CULVERT. Harlan G. Moats, Villisca, Iowa. Filed July 12, 1905. Serial No. 269,305.

A culvert comprising end collars having annular grooves formed in one face and a groove in the periphery thereof, segmental slabs having their ends engaging the annular grooves, end slabs engaging the peripheral grooves and forming a wall, grooved posts engaging the ends of said slabs, intermediate supporting-collars having annular grooves formed in both faces to receive the ends of the slabs, said collars having integral lugs formed on the circumference thereof, and longitudinal bolt-rods secured in the lugs and extending the entire length of the culvert.

818,389.—MOSQUITO-GUARD FOR CISTERNS AND TANKS. Benjamin C. Mire, New Orleans, La. Filed Aug. 18, 1905. Serial No. 274,774.

The combination with a pipe; of a mosquito-guard comprising bars having barbs embedded in the upper portion of the pipe, a swinging, apertured gate hinged to the said bars and arranged to gravitate against the end of the pipe, and an arm extending forwardly and upwardly from the lower portion of the gate and provided with a weight.

818,294.—BORING-BAR. John Riddell, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. Filed Sept. 19, 1903. Serial No. 173,757.

A boring-bar provided with a plurality of separate independently-movable tool-carriages which are angularly disposed about the axis of said bar.

818,298.—RAILROAD-RAIL JOINT. Elvis P. Sandefur, Manda, Ky. Filed Jan. 16, 1905. Serial No. 241,390.

The combination, with the alined ends of railroad-rails whose web and base are cut away, the web thus having a horizontal and inclined portion, of a joint-bar having a broad base and vertical flanges which are separated by a space adapted to receive the webs of the meeting rails and having the bottom of the groove between said flanges formed with a central, horizontal portion and other portions sloped therefrom toward the respective ends of the bar, substantially as described.

818,327.—METAL SHEET-PILING. John R. Williams, East Orange, N. J. Filed Jan. 15, 1906. Serial No. 296,015.

A metal sheet-piling, composed of interlocked sections each being in one integral piece of metal comprising a web, a flange projected from the side of one edge thereof and a loop being closed at its outer end and open at its inner end adjacent to the adjoining edge of the web, and said flanges and loops on said sections being of a formation adapting them to interlock one upon the other, whereby they resist any pressure applied against the face of the sections tending to separate the same; substantially as set forth.

LEGAL DIGEST—
A Summary of RECENT DECISIONS

Better Take Bonds!

W. E. BLACK, appellant, vs. Board of County Commissioners Polk County, respondent.—The General Laws of 1901 make it the duty of a public corporation when it enters into a contract for the making of any public improvement to take from the contractor a bond. Held that the liability imposed by the statutes upon the corporation when it neglects to take the statutory bonds is incurred when the contract is valid.—*Order reversed. Judge J. Elliott. Polk County, Minnesota.*

Condemnation for Power Purposes

BROWN vs. Gerald.—The mere creation and distribution of power for manufacturing enterprises is not a public use which would justify an exercise of the power of eminent domain.—*Supreme Court of Maine.*

Improvements Must Be Considered

THE Village of St. Johnsville vs. Smith.—One whose lands have been trespassed upon and improvements made thereon by a municipality in connection with its water supply is entitled, in proceedings subsequently commenced by it to condemn the lands, to have the improvements made by the municipality taken into consideration in fixing his compensation. The court said, however, that the measure of such compensation was neither the cost of the improvements nor their value, nor the value of their use to the municipality, but the enhanced value of the lands on account thereof.—*New York Court of Appeals.*

No Authority to Investigate

THE State Senate had no authority to authorize the investigation of the public offices of Cincinnati and Hamilton county, as carried on by the Drake Committee. The opinion of the court was that the power set up is judicial and not legislative.—*Opinion by Judge Samuel W. Smith, Common Pleas Court, Cincinnati, Ohio.*

Waterpower—a Public Utility—Sometimes

MINNESOTA Canal and Power Co. vs. The Koochiching Co.—The Power of eminent domain can be exercised by a private individual or corporation only by express legislative authority. That a use is not public unless, under proper regulations, the public has the right to resort to the property for the use for which it was acquired. The generation of electricity by water power for sale was a public enterprise, but that the creation of a water power for the purpose of supplying power from the wheels was a private enterprise.—*Supreme Court of Minnesota.*

Can't Wear Uniforms in School

THE right of the State Education Department to prevent teachers in public schools from wearing the uniform of any religious or other organization was upheld.—*New York Court of Appeals.*

CALENDAR OF EVENTS

May 1-4.
AMERICAN ELECTRO-CHEMICAL SOCIETY.—ANNUAL MEETING, ITHACA, N. Y.—S. S. Sadtler, Secretary, 39 South 10th Street, Philadelphia, Pa.

May 1-4.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—SEMI-ANNUAL MEETING, CHATTANOOGA, TENN.—F. R. Hutton, Secretary, 12 West Thirty-first Street, New York.

May 2-4.
AMERICAN SOCIAL SCIENCE ASSOCIATION.—GENERAL MEETING, UNITED CHARITIES BUILDING, New York.

May 9-16.
NATIONAL CONFERENCE OF CHARITIES AND CORRECTIONS CONVENTION.—Philadelphia.

May 16-18.
WESTERN GAS ASSOCIATION.—AT THE HOLLENDEN HOUSE, CLEVELAND, OHIO.—James W. Dunbar, Secretary, New Albany, Ind.

May 22-24.
NATIONAL FIRE PROTECTION ASSOCIATION.—ANNUAL MEETING, CHICAGO, ILL.—Wm. H. Merrill, Jr., Secretary, Chicago, Ill.

May 28-*June* 1.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—ANNUAL CONVENTION, MILWAUKEE, WIS.—Ralph W. Pope, Secretary, 95 Liberty Street, New York.

June 5-7.
NATIONAL ELECTRIC LIGHT ASSOCIATION.—ATLANTIC CITY, N. J.—W. C. L. Elgin, Secretary, 136 Liberty Street, New York.

June 11-13.
ASSOCIATION OF AMERICAN PORTLAND CEMENT MANUFACTURERS. QUARTERLY MEETING, ATLANTIC CITY, N. J.—Earle E. Bottomly, Assistant Secretary, Land Title Building, Philadelphia.

June 20-23.
NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS.—ANNUAL CONVENTION, HOTEL ST. CHARLES, ATLANTIC CITY.—Henry B. Gombers, Secretary.

June 21-23.
AMERICAN SOCIETY FOR TESTING MATERIALS.—ANNUAL MEETING, ATLANTIC CITY, N. J.—Edgar Marburg, Secretary, University of Pennsylvania, Philadelphia.

June 26.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—ANNUAL CONVENTION, THOUSAND ISLANDS, NEW YORK.—Charles Warren Hunt, Secretary, 220 West Fifty-seventh Street, New York.

June 26-28.
NATIONAL INTERSTATE TELEPHONE ASSOCIATION.—Auditoriun. Hotel, Chicago, Ill.

July 10-14.
AMERICAN WATER WORKS ASSOCIATION.—ANNUAL CONVENTION AT BOSTON, MASS.—J. M. Diven, Secretary, 14 George Street, Charleston, S. C.

August 15-17.
INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.—ANNUAL MEETING, NEW HAVEN, CONN.—Frank P. Foster, Secretary, Corning, N. Y.

September 26-28.
LEAGUE OF AMERICAN MUNICIPALITIES.—TENTH ANNUAL CONVENTION AT CHICAGO.—John MacVicar, Secretary, Des Moines, Iowa.

October 9-12.
INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—DALLAS, TEX. Jos. McFall, Secretary, Roanoke, Va.

October 15-20.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION AT COLUMBUS, OHIO.

ADVANCE AND WEEKLY CONTRACT NEWS

Relating to Municipal and Public Work—The Construction Field—Proposals and Contracts—Sewerage and Water Supply —Street Improvement and Lighting—Fire Equipment—Buildings and Bridges

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STREET IMPROVEMENTS

Anniston, Ala.—The telegraph company will remove their poles from business streets and the telephone company will place their wires under ground.

Montgomery, Ala.—Bids will be received, May 7, for paving several streets. —R. S. Williams, City Treasurer.

Carmi, Ill.—The City Council has decided to expend $10,000 for sewer improvements.

Chicago, Ill.—About 150 miles of street paving will be laid at a cost of $6.000,000.

South Chicago, Ill.—Four dangerous crossings will be eliminated by the elevation of tracks.

Danville, Ill.—The township will pave the road from Danville to Batestown; later other roads will be paved.

Joliet, Ill.—Western avenue will be paved with asphalt.

Peoria, Ill.—Bids will be received, May 7, for improving several streets.—E. A. Furry, City Engineer.

Rock Island, Ill.—Several streets will be paved.

Urbana, Ill.—The city will expend $45,-000 for street paving.

Wheaton, Ill.—Nine miles of paving, costing $225,000, will be laid by the city.—C. A. Prout, Engineer.

Bateville, Ind.—The issuance of $4,000 street improvement bonds is being considered.

Brazil, Ind.—North Meridan place will be paved; material not specified.

Fort Wayne, Ind.—The contract for paving Wallace street will be let shortly.

Indianapolis, Ind.—The Marion County Contracting Company have been awarded the contracts for repairing asphalt and vulcanite streets.

Indianapolis, Ind.—Bids will be opened, May 8, for the construction of seven miles of macadamized road in Johnston township; also two miles in Ripley County and two miles in Otter Creek township.—Nicholas Volz, County Auditor.

Marion, Ind.—Brick paving will be used on certain streets.

Osgood, Ind.—Bids will be received, May 8, for constructing seven miles of macadamized road.—Nicholas Volz, County Auditor.

Rockville, Ind.—Bids will be received, May 7, for a gravel road.—Henry Grubb, Auditor.

Sheridan, Ind.—Main street will be paved with brick; cost, $35,000.

Versailles, Ind.—Bids will be received, May 8, for constructing two miles of macadamized road.—Nicholas Volz, Auditor.

Waterloo, Iowa.—Two miles of brick paving will be constructed.

Emporia, Kan.—Union street will be paved.

Ashland, Ky.—A number of streets in Maysville will be paved at a cost of $250,-000.

Ashland, Ky.—In the extensive paving which is to be done Peebles block will be used.—Jno. Bradley, of Nashville, Tenn., contractor.

Covington, Ky.—An ordinance has been passed for the improvement of Scott, Fifth and Ninth streets.

Maysville, Ky.—An election will decide the question of issuing paving bonds.

Newport, Ky.—Contracts for a large amount of paving have been awarded to R. H. Fleming and Company, R. L. Schoolfield and the Barbor Asphalt Company; brick and asphalt will be used.

Newport, Ky.—Many streets will be reconstructed with brick.

New Orleans, La.—Palmer avenue will be paved with vitrified brick.

Snow Hill, Md.—The question of issuing $25,000 bonds for road improvements is under discussion.

Adrian, Mich.—Several streets will be paved with brick.—James Blair, City Engineer.

Jackson, Mich.—Bids will be received, May 7, for constructing cement walks and curbings.—J. F. Harrison, Superintendent Board of Public Works.

Minneapolis, Minn.—The Barber Asphalt Company has been awarded the contract for re-surfacing 113,000 square yards of asphalt streets.

Springfied, Mo.—The question of issuing street improvement bonds will be voted on.

Geneva, N. Y.—Legislation will be introduced to pave Cherry and Seymour streets

Jamestown, N. Y.—Brick paving for Hazard street is being considered.

Syracuse, N. Y.—Plans are under way to construct fifteen or twenty miles of cement walks.

Akron, O.—The paving of Miller street is being discussed.

Ashland, O.—Center street and Highland avenue will be paved, while the question of paving Third, Fourth, Walnut and Vine streets is being considered.—Engineer Niederheiser, City Engineer.

Ashland, O.—Bids will be opened, May 19, for the purchase of 18 $500 road improvement bonds for Montgomery township.—M. Bachman, Chairman.

Ashland, O.—The ordinances to pave Bath avenue, Twelfth, Fifteenth and Seventeenth streets and Central and Winchester avenues have passed Council.

Ashtabula, O.—Plans for curbing and paving with asphalt, Walnut street, Hulbert street, Camp alley and Bank street are being prepared.

Ashtabula, O.—Plans are being prepared for paving Lake street; also for grading and draining First street.

Bedford, O.—The Akron, Bedford and Cleveland railroad will pave a portion of its road in Bedford at a cost of $30,000.

Bellevue, O.—Estimates will be asked for the paving of Sandusky and Monroe avenues.

Bucyrus, O.—Bids will be opened, May 12, for the purchase of ten $500 road improvement bonds.—Chas. McConnell, City Clerk.

Bucyrus, O.—Charles street will be paved its entire length.

Cambridge, O.—Adams Brothers, of Zanesville, have a $70,000 contract for street paving and improvements.

Cambridge, O.—Street improvement bonds, $3500, will be issued.—C. L. Blackburn, Clerk.

Cambridge, O.—The paving of Tenth street will be done by Kelly Brothers, of Portsmouth; asphalt will be used.

Cincinnati, O.—An ordinance to pave Albany avenue with block has been introduced.

Cincinnati, O.—Auburn avenue will be paved with asphalt, Lowery street with brick, Arlington street with brick, Popular street and Betts street with asphalt and Clifton avenue with granite.

Cincinnati, O.—Covington and Newport have arranged to pave Scott street and Fifth street with creosoted wood blocks.

Cleveland, O.—The City Council will decide the paving of several miles of street in

the hamlet of Lakewood.—D. M. Cook, Clerk.

Cleveland, O.—The City Clerk announces that resolutions for grading, draining and paving many streets have passed the Council.

Columbus, O.—The resolution to pave Alsop street, Hunter avenue, Mitchell street, Woodruff avenue, Chittenden avenue, Seventh avenue, Hawkins avenue, Stodart avenue, Wetmore avenue and Fourteenth avenue has passed the Council.

Columbus, O.—Bids will be opened, May 9, for grading and paving Carpenter street, Forsythe street and Guilbert street with asphalt.—Ed. F. McGuire, Secretary, Board of Public Service.

Columbus, O.—The cost of paving Broad street with asphalt is estimated at $60,000, and with macadam $77,000.

Dayton, O. — Rubicon street, Bechel street and Third street will be paved.

Dayton, O.—The Clerk of the Board of Public Service has been authorized to advertise for bids for paving First street, Goodhue avenue, Summit street, Monument avenue and a number of alleys. Plans for paving Fourth avenue from Williams to Conover street are being prepared.

Dayton, O.—The County Commissioners are contemplating the expenditure of $100,000 for constructing roads in Montgomery county.

Dayton, O. — The County Commissioners have been asked to macadamize the Dayton and Wilmington pike.

Delaware, O.—Owing to a technical error in the bid of the Gantz Contracting Company for the paving of streets, the bids are readvertised.

Delaware, O.—South Franklin street, Wootring street and Chamberlain street will be macadamized.—F. D. King, City Clerk.

Dennison, O.—Second street will be paved; material not specified.

East Livingston, O.—Mulberry street will be paved.

Findlay, O.—Bonds, $5,000, have been issued for park purposes. The City Engineer has recommended a concrete foundation for paving East Lincoln street.

Fremont, O.—The Council has authorized the City Engineer to prepare plans for paving many streets.

Fremont, O.—Specifications will be prepared for both brick and asphalt in the paving of McPherson avenue and of Franklin street. Metropolitan block will be used to pave Arch street.

Hamilton, O.—Bids on street asphalt of all kinds, bitulithic, vitrified brick and bituminous macadam, will be advertised for street paving.

Jefferson, O.—The macadamizing of Chestnut and Jefferson streets is under consideration.—B. F. Perry, Clerk.

Lima, O.—The petition to pave North street with brick is being investigated.

Lorain, O.—The paving of Oberlin avenue is being discussed by the residents.

Mansfield, O.—A bond issue of $10,800 will be made for street improvements.

Marietta, O.—Fifth street will be paved with both asphalt and brick; Fort street and Third street will also be paved.

Marion, O.—Bids will be received, May 9, for paving Oak street with vitrified block.—William Fries, Clerk.

Massillon, O.—A large amount of street paving is to be done.—Harold Howland, City Engineer.

Miamisburg, O.—Both brick and macadam will be used in paving Fourth street, Pearl and other streets.

Mt. Vernon, O.—Vitrified brick or asphalt will be used to pave High street; a curb of stone and cement will be put in.—J. H. Wootton, Clerk.

Mt. Vernon, O.—Bids will be received for paving Blackberry alley and West High street with vitrified brick.

Norwood, O.—Bids will be received, May 19, for improving certain streets.—George H. Steacy, Clerk.

Painesville, O.—Erie street will be paved; plans are being prepared by Engineer Cummings.

Plymouth, O.—Bids will be opened, May 7, for the purchase of 20 $500 road improvement bonds.

Richwood, O.—Chestnut street will be paved; Tenth street will be improved.—Wm. Epps, contractor.

Sandusky, O.—M. J. Callan has the contract for paving Railroad street.

Springfield, O.—The laying of sewers will be followed by extensive paving improvements. Bitulithic, asphalt, vitrified brick or block will be used.

Springfield, O.—Two bids for the paving of South Center street have been offered, one at $15,000, in which vitrified brick will be used, while if asphalt or bitulithic is used, the cost will be $16,700.

Springfield, O.—The construction of cement curbs, gutter and sidewalks on forty streets is being considered.

Steubenville, O. — The Council and the County Commissioners will co-operate in having Market street road paved with brick. Engineer Cox has been awarded the contract.

Tiffin, O. — The Township Trustees of Scipio will expend $12,000 constructing roads during the coming season.—R. H. Porter, Chairman.

Toledo, O.—The question of issuing $80,000 paving bonds will be decided.

Toronto, O.—The contract for paving a number of streets with Nicholson brick has been awarded Rosser & Maloney of Bellaire.

Troy, O.—Main and Market streets will be paved.

Warren, O.—Bids will be opened May 8, for $15,000 bonds for macadamizing roads.—W. M. Griffith, Clerk.

Warren, O.—The paving of East Franklin and South Pine streets with asphalt block, brick or other material is being considered.

Warren, O.—Smith & McGlashen have the contract for paving Scott street and Washington avenue.

West Bremen, O.—The Council will pave Washington street; a sewerage system will also be astablished in the village.

Wooster, O.—The paving of the lower end of Spruce street is under consideration; macadam may be used.

Wooster, O.—College avenue will be paved and sewered.

Youngstown, O.—Petitions are now in circulation for improving a large number of streets in the north section of the city.

Youngstown, O.—The city will expend $44,000 for macadamizing the roadways around Wick Park this summer.

Youngstown, O.—The Good Roads Commission may authorize the paving of West Park avenue; macadam will be used.

Youngstown, O.—Bids will be asked for paving Warren avenue, Wick avenue and Wilson street.

Zanesville, O.—Muskingum street will be paved with vitrified brick; concrete curb will be installed.

Pendleton, Ore.—The paving of a number of streets is being considered.

New Castle, Pa.—The telephone company will place its wires in conduits.

Uniontown, Pa.—A vote will be taken on the proposition to issue $100,000 street improvement bonds.

Knoxville, Tenn.—An ordinance to require the wires in the uptown district to be placed underground will be approved.

Dallas, Texas.—Street improvement bonds will be issued.

San Antonio, Texas.—A macadam turnpike 150 miles long, will be built.—Address Judge John Sweeney, El Paso, Texas.

Barton Heights, Va.—Bonds in the sum of $15,000 have been voted for street improvements.

Norfolk, Va.—Main street will be improved; cost, $55,000.

Suffolk, Va.—Bids will be received, May 11, for material and labor for grading, curbing and paving streets, approximating 40,000 square yards. Paving material not yet decided upon.—J. H. McCleary, Chairman.

Wheeling, W. Va.—Extensive paving improvements are to be made.

Wheeling, W. Va.—Higgins & Hirsh have been awarded the contract for paving in the village of Benwood.

Ballard, Wash.—Marcus avenue will be improved, at a cost of $17,000.

Bay City, Wis.—Residents of Walnut street have petitioned for a new pavement, and a report will be made by the Board of Public Works shortly.

Green Bay, Wis.—An ordinance has been approved for a $30,000 bond issue for street improvements.

Racine, Wis.—Bonds, $50,000, have been voted for street improvements, including sewers, paving and curbing.

Winnipeg, Manitoba, Canada.—Bids will be received to supply the city with 40,000 barrels of cement.—C. J. Brown, City Clerk.

SEWERAGE

Oakland, Cal.—Numerous storm and sanitary sewers will be built; improvements to cost $500,000.

Oakland, Cal.—Storm sewers for Lake Merrett and Pleasant Valley will be constructed.

Reno, Cal.—The issue of $500,000 bonds for sewer and other improvements has been favored.

Vacaville, Cal.—Bonds, $25,000, have been voted for a sewerage system.

DeLand, Fla.—A bond issue of $15,000 has been provided for a sewer system. The septic tank system will be established.

Jacksonville, Fla.—The sewerage system will be improved.—Wm. C. West, Engineer.

Dawson, Ga.—The city will issue $35,000 5 per cent. sewerage bonds.

Elgin, Ill.—An expenditure of $35,000 will be made to extend the sewer system.

Polo, Ill.—Bids will be received for the construction of a sanitary sewer system.—J. W. Dappert, Taylorsville, Ill., Engineer.

Wilmette, Ill.—Glencoe and Winetka will install sewer systems at a cost of $200,000.

Elkhart, Ind.—A trunk line sewer will be built to drain Northeast Elkhart.—A. M. Smith, City Engineer.

Indianapolis, Ind.—The re-advertisement of bids for the construction of the West Indianapolis sewer will be made.

Marion, Ind.—Plans for the construction of sanitary sewers in Twenty-fourth street will be prepared.

Durant, I. T.—Bonds, $20,000, have been voted for a sewerage system.

Anamosa, Iowa.—Proposals for the construction of a sanitary sewer will be received.—L. J. Fisher, Clerk.

Burlington, Iowa.—The Burlington Construction Company has the contract to build the Stoney Lonesome sewer.

Ellsworth, Kan.—Sewers will be constructed by E. Wellington.

New Orleans, La.—Additional sewer and water bonds will be issued.

Livermore Falls, Me.—About 4½ miles of various sizes of sewer are to be laid at an estimated cost of $25,000.—Edwin S. Riley, Chairman Board of Sewers.

Baltimore, Md.—Plans and specifications for improvements to the sewerage system are being discussed.

Whittinsville, Mass.—A sewerage system, costing $80,000, will be constructed.

Escanaba, Mich.—Bids will be received, June 15, for constructing 4,678 feet of 8-inch pipe sewers; probable cost, $45,200.

Jackson, Mich.—The city has issued $60,000 sewer improvement bonds.

Marquette, Mich.—The Hewitt avenue sewer main will be repaired.

Bemidzi, Minn.—Plans for $40,000 sewer improvements are being made.

Biwabik, Minn.—The city will expend $10,000 in sewerage improvements.

Minneapolis, Minn. — Cement brick are being used in the construction of sewers. These bricks cost 90 cents less on the thousand than ordinary clay brick.

South Omaha, Neb.—E. M. Rohrbough is preparing plans for a $250,000 sewer system.

Elizabeth, N. J.—Additional sewers will be constructed, at a cost of $150,000.

Akron, O.—A $35,000 storm sewer will be constructed in South Akron.

Ashtabula, O.—A large amount of sewer work is to be done.

Barberton, O.—Bids will be opened, May 14, for improving the main sanitary sewer.—George Davis, Clerk.

Cadiz, O.—Several streets will be sewered and paved.

Cleveland, O.—Bids will be opened, May 10, for changing the channel of the creek at the outlet of the main intercepting sewer in Collinwood.—A. R. Callow, Secretary.

Cleveland, O.—The Secretary of the Building Commission will advertise for deflecting the Ontario street sewer, which now runs under the site of the new Courthouse.

Columbus, O.—The State Board of Health has plans under advisement for a sewer system in Cuyahoga Falls.

Dayton, O.—Robt. W. Kline, City Engineer, estimates the cost of the Miami Boulevard sewer to be $13,000.

Dayton, O.—The installing of storm sewer on North and South Broadway is estimated at $38,000.—Robert W. Kline, City Engineer.

Findlay, O.—Proposals for sewers on Mechanic street and Meeks avenue will be received.

Findlay, O.—Bids are advertised for the construction of an intercepting sewer on the north side.

Girard, O.—This village will be bonded in the sum of $80,000 for constructing a sewer system.

Lakewood, O.—Plans are on file for the sewer system which will be installed.

Lancaster, O.—Extensive sewer improvements will be made in districts No. 1 and No. 2.—B. E. Shell, Clerk.

Lorain, O. — Contracts for brick storm sewer will be let.

Madison, O.—The ctiy will construct 7,200 feet of 12-inch sewers.

Newark, O.—Buena Vista will be improved by sewering.

Portsmouth, O.—The Robinson avenue sewer, which is being constructed by S. P. Baird, will be finished January 1, 1907.

Ravenna, O.—Bids will be received, May 15, for furnishing all material for constructing 13½ miles of pipe sewers; also for 13½ miles of vitrified clay sewer pipe, and for constructing a sewer disposal plant and all appurtenances.—E. W. Marvin, Clerk.

Springfield, O.—Extensive plans for the construction of sanitary sewers are being made.—W. H. Sierverling, City Engineer.

Springfield, O.—Sewers will be laid in Yellow Springs and Washington streets.

St. Mary's O.—Bonds, $25,000, will be issued for sewerage improvements.

Youngstown, O.—Bids will be opened, May 7, for $50,000 improvement bonds, $2,500 sewer bonds, and $28,000 Glenwood avenue sewer bonds.

Altoona, Pa.—Proposals will be received, May 9, for the construction of storm water and district sewers as follows: A reinforced storm sewer in Twenty-fourth street; a brick or concrete sewer in Twelfth avenue, Eleventh avenue and Eleventh street; extension of First District sewer; extension of Fourth District sewer, and a storm sewer in Third street.—George W. Kuebler, Chairman.

Chester, Pa.—Bids will be advertised for constructing several street sewers.

Edgeworth, Pa.—Bids for the construction of 14,000 feet of 12x36 inch sewer and appurtenances will be opened by the Council, May 12.—Fleming Nevin, Secretary.

Williamsport, Pa. — Bids will be received for the construction of about one mile of sewer.—James F. Fisher, City Engineer.

Wilkesbarre, Pa.—The sewer system here will be extended.

Aberdeen, S. D.—The city will issue $75,000 sewer bonds.

Redfield, S. D.—The question of issuing $30,000 sewer bonds will be decided by an election.

Webster, S. D.—The city will expend $10,000 for sewer construction.

Knoxville, Tenn.—The proposed issue of $500,000 sewer bonds will probably be carried.

Dallas, Tex.—Larger sewers are recommended.—Leon Dalton, Engineer.

Fort Worth, Tex.—Plans are being prepared for the sewerage disposal of the packeries at Fort Worth; the cost will probably be $250,000.

Terrell, Tex.—The City Council has arranged for a sewage system in the northwestern part of the city.

Winchester, Va.—The issuing of $50,000 sewer bonds is being discussed.

Prosser, Wash.—The proposed sewerage system will be one and a quarter miles in length and will cost $16,000.

Seattle, Wash.—Plans are being prepared for sewerage protection in the North Capitol Hill district.

Waitsburg, Wash.—Bids will be received, May 7, for labor and material necessary in constructiong a sewerage system. Work includes the purchase of 15,000 4 x 6-inch sewer pipe specials, one septic tank and one filter bed.—C. E. Bateman, Clerk.

Sheboygan, Wis.—The Kentucky avenue sewer will be constructed.

WATER SUPPLY

Anniston, Ala.—The building of a waterworks and electric-light plant is being considered; bids for franchise will be received.

Selma, Ala.—Bids will be received, May 14, for water bonds, payable in 20 years, interest 5 per cent.—F. P. Taler, City Clerk.

Acworth, Ga.—A waterworks system will be constructed.—J. B. McCrany, Atlanta, Engineer.

Cairo, Ga. — Bonds, $10,000, have been voted for water supply.

Christian, Ill.—Bonds, $6,000, have been voted for a waterworks plant.

Harmon, Ill.—A system of waterworks will be built.

Brazil, Ind.—Plans for a 600,000-gallon reservoir have been completed. Bids will be advertised for.

Hagerstown, Ind.—The issuing of $10,000 water bonds is under consideration.

Indianapolis, Ind. — The Indianapolis Water Company will improve the water system, at a cost of $45,000.

Marietta, Ind.—A waterworks system is to be installed.

Durant, I. T.—The citizens have voted to issue $20,000 bonds for erecting a water plant.

Madill, I. T.—A waterworks system has been proposed.

Holton, Kan.—Bonds, $50,000 will be issued for water supply.

Newton, Kan.—Bonds, $77,500, will be issued for outstanding waterworks crib.

Winfield, Kan.—Bonds, $85,000, will be issued for waterworks.

Covington, Ky.—The Waterworks Commissioners recommend the extension of water mains; cost, $20,000.

Glen Echo, Md.—An issue of $7,000 bonds will be made for waterworks improvement.

Lawrence, Mass.—The city will expend $50,000 in waterworks improvements.—A. D. Marble, City Engineer.

Charlevoix, Mich.—A water tower will be erected.

Saginaw, Mich.—A water-filtration plant, with a daily supply of 10,000,000 gallons, is under consideration; cost, $100,000.—Ira H. Jewell, Chicago, contractor.

Kelleher, Minn.—Contracts will be let for water system.

Minneapolis, Minn. — A plan to divert Bassett's Creek from the Mississippi at North Thirteenth street will be considered. —Andrew Rinker, City Engineer.

Meridian, Miss.—The city will issue $125,000 water bonds.

Lewiston, Mont.—Bids will be received, the last of May, for $35,000, 5 per cent. water bonds.

Cambridge, Neb.—The question of issuing $5,000 water bonds will be decided.

Cambridge, Neb.—The city will expend $20,000 for a waterworks system.

Newport, N. H.—Bids for laying three miles of water mains will be asked.

Anglesea, N. J.—The issuance of $50,000 water bonds will be decided.

Bergen, N. Y.—The citizens have voted to issue $20,000 water bonds.

Dunkirk, N. Y.—A bond issue of $30,000 for waterworks is to be advertised.

Massapequa, N. Y.—S. H. Haight, A. T. Haight and others have organized the Massapequa Water Company; capital, $95,000.

New York, N. Y.—The Knickerbocker Ice Company will issue $6,000,000 in water bonds.

Rochester, N. Y. — The Rochester and Lake Ontario Water Company will expend $80,000 in extending its system.

Victor, N. Y.—A water supply system, costing $12,000, will be constructed.

Hickory, N. C.—The Water Power Electric Company has been incorporated, with a stock of $200,000.

Salem, N. C.—An election will be held, June 26, to decide the question of issuing $125,000 water bonds.

Winston, N. C.—The issuance of $125,000 water bonds is to be voted on.

Sheldon, N. D.—The citizens have voted to issue water bonds.

Akron, O. — A reservoir between State Mill and Long Lake will be built; a lock to allow launches to pass through to the larger reservoir will be constructed.

Ashtabula, O.—The question of issuing $375,000 in municipal waterworks bonds will be settled, June 5.

Dayton, O.—The County Commissioners will establish a waterworks plant at the infirmary; cost, $4,600.

Dayton, O.—City Engineer Kline's estimate for a temporary dam over the Miami River is $2,000; a permanent dam would cost $50,000.

Fostoria, O. — The question of issuing $50,000 municipal water bonds will be submitted to vote of people. The City Heat & Light franchise expires in August.

Newton, O.—A water system will be installed.

Norwood, O. — The proposition to sink two wells at the waterworks is being considered; an electric-light station will also be installed.

Oberlin, O.—The water system will be extended and enlarged.

Sandusky, O.—A filtration plant, to cost $60,000, will be built.

Perry, Okla. — The issuance of $30,000 waterworks bonds will be voted on.

Tecumseh, Okla. — The question of issuing $60,000 waterworks bonds will be voted on, May 8.

Jefferson, Ore.—Bonds will be issued for a waterworks system.

Hellam, Pa.—The waterworks system is to be improved.

Pittsburg, Pa. — Bonds, $500,000, for waterworks will be issued.

Arlington, S. D.—The question of issuing $13,000 waterworks bonds will be decided by election.

Bishopville, S. D.—The citizens will decide the question of issuing $5,000, 6 per cent., water bonds.

Flandreau, S. D. — Bonds, $5,000, have been voted for water supply.

Wessington Springs, S. D.—The issue of $18,000 in bonds for constructing a water system will be decided.

Woonsocket, S. D.—The Council will improve the water supply.

Manchester, Tenn.—The issuing of $20,000 bonds for a filtering plant is under consideration.

Sweetwater, Tenn.—Plans are being prepared for a water system.

Gilmer, Tex.—Water bonds will be issued.

Houston, Texas.—The question of issuing bonds for the purchase of the water plant is to be decided by vote.

Waxahachie, Tex.—The issuing of $10,000 waterworks bonds will be voted on.

Farmington, Utah.—A $15,000 water system is to be installed.

Price, Utah.—The city will issue $100,000 water bonds.

Beckley, W. Va.—Bonds, $25,000, will be issued for waterworks.

Edinburg, Va.—Waterworks construction bonds are under consideration by the people.

New Martinsville, W. Va.—Bonds, $10,000, will be issued for the construction of a storage reservoir.

Wheeling, W. Va.—The Water Works Board is considering plans and specifications for a reservoir.

Wheeling, W. Va.—The water system will be improved.

Bellows Falls, Vt.—The Fall Mountain Electric Light and Power Company will establish a water-power station to furnish power for the light plant.—William A. Russell, Boston, President.

North Yakima, Wash.—The matter of issuing $450,000 bonds for a water plant is under consideration.

Seattle, Wash.—A 1,000,000-gallon reservoir will be constructed at Fort Flagler.

Seattle, Wash.—The Fidelity Land and Irrigation Company has been organized, with a capital of $250,000. Artesian wells for irrigation purposes will be sunk.

Green Bay, Wis.—D. W. Mead, of Chicago, has plans for reconstruction of the pumping system; estimated cost, $25,000.

Madison, Wis.—The Water Commissioners are considering plans for a million-gallon reservoir.

Merrill, Wis.—The Merrill Paper Manufacturing Company will erect a large pump house at this place.

Montreal, Que., Canada.—The Superintendent of Water Works has asked $159,355 for improvements.

PUBLIC LIGHTING

Montgomery, Ala.—The two local electric companies have consolidated; $100,000 will be spent in improvements.

Hot Springs, Ark.—The Hot Springs Electric Light Company will place its lines in conduits.

Pulaski, Ark.—The Pulaski Gas Light Company will expend $100,000 in improvements; ten miles of mains will be laid.

Pasadena, Cal.—The issuance of bonds for municipal lighting is recommended.

Washington, D. C.—The District Commissioners are considering improving the lighting system in West Washington.

Fort Pierce, Fla.—An electric plant will be installed by the St. Lucy's Ice Company.

Galesburg, Ill.—A light plant may be constructed. The Home Light and Power Company, Promoters.

Quincy, Ill.—The Quincy Gas and Electric Company will extend and improve its plant.—George W. Mason, Engineer.

Sterling, Ill.—The Sterling, Dixon and Eastern Electric Railway Company will improve Central Park, installing an electric-light system.

Richmond, Ind.—By a vote of the people, the question of expending $40,000 for electric-light improvements will be settled.

Shoals, Ind.—Jerome Herff, Joseph Andrews and others will erect a power plant.

Muskogee, I. T.—W. L. Reeves, A. W. Rabb and others will establish an electric-light plant.

Carroll, Iowa.—Nicholas & Kelly of Perry will erect and maintain a gas plant.

Oelwein, Iowa.—A gas plant will be installed.

Sibley, Iowa.—The construction of a gas-lighting plant is being considered.

Sioux City, Iowa.—The Sioux City Traction Company will erect an office building; also an electric-light plant. Power will be furnished for running street cars.

Gaylord, Mich.—The people will decide the question of issuing $5,000 electric-light bonds, May 7.

Greenville, Mich.—Municipal light is under consideration; the contract now in force expires within a year.

Port Huron, Mich.—The Practical Gas Light Company of North Chicago has asked for a franchise for a lighting system.

Rockland, Mich.—The Victoria Mine Company will install an electric-lighting plant for use in its mine, and may furnish the village of Rockland with light.

Natchez, Miss.—The question of issuing $75,000 electric-light bonds is being discussed.

New Madrid, Mo.—The electric-light plant has been destroyed by fire.

Bradshaw, Neb.—Fire has damaged the electric-light system; it will be repaired.

Omaha, Neb.—The Lighting Committee will replace 250 gasoline lamps used in outlying districts, with 85 arc lamps, and 15 32-candlepower incandescant lamps.

Attica, O.—Bids will be opened, May 14, for the purchase of $2,000 4-per cent electric-lighting coupon bonds, dated March 1, 1906.—Geo. H. Hamilton, Clerk.

Beverly, O.—Bids are advertised for the installation of an electric-light plant at the courthouse.

Bowling Green, O.—The officials of the Rifle Range, near Port Clinton, will erect an electric-lighting plant.—Address Inspector-General of Rifle Practice, Ohio National Guard, Columbus.

Cleveland, O.—The question of issuing $25,000 electric-lighting bonds will be decided shortly.—A. R. Callow, Secretary.

Dayton, O.—A franchise has been granted the Dayton Citizens' Electric Company for a plant which will cost $1,500,000.—Valentine Winters, President.

Fostoria, O.—The Council will issue $50,000 in bonds for an electric-light plant in connection with the water system.

Marietta, O.—The County Commissioners have decided to install an electric plant at the Court House.

Paineville, O.—A municipal lighting plant is being considered.

Toledo, O.—Bids will be advertised for electric-lighting for periods of five and ten years.

Darby, Pa.—A franchise has been granted the Philadelphia Suburban Electric Company to establish an electric-lighting plant.

Hawley, Pa.—The plant of the Hawley Electric Light Company has been purchased by V. A. Decker, F. C. White and Lewis Cooke; about $20,000 will be expended in improvements.

Somerset, Pa.—The Somerset Light and Power Company will furnish adjacent towns with light and heat.—J. M. Bricker, Manager.

Saunderstown, R. I.—An electric-lighting system will be installed by the Wickford Light and Water Company.

Aberdeen, S. D.—The issuance of $36,000 municipal lighting bonds has been decided upon.

Independence, Va.—The Independence Electric Light and Milling Company will build a roller mill and electric plant.

Pulaski, Va.—The city will establish a new electric plant, much larger than the present one.

Bremerton, Wash.—A municipal lighting plant will be installed.

Pasco, Wash.—Franchise to establish an electric-light system has been granted Dr. N. Fred Essig of Spokane.

Kaukauna, Wis.—The Kaukauna Gas and Electric Light Company has been reorganized and the capital increased to $100,000.

La Crosse, Wis.—The La Crosse Hydro-Electric Light and Power Company has increased its stock to $5,000,000.—Samuel Insull, Milwaukee, President.

Milton, Wis.—A company is being organized to secure a lighting plant.

Calgary, Canada.—The municipal lighting plant will be increased by expending $30,000.

FIRE DEPARTMENT SUPPLIES

Bessemer, Ala.—The erection of a hose house is recommended.

Washington, D. C., Bids for a combination chemical engine and hose wagon are advertised for.

Galesburg, Ill.—Additional hose and an aerial truck will be purchased.

Evansville, Ind.—The Board of Public Safety recommends the erection of a new hose house.

Decorah, Iowa.—A fire alarm system may be installed.

Springfield, Mass.—The Fire Commissioners have recommended the expenditure of $26,000 on improvements; also the addition of twenty permanent men to the department.

Ann Arbor, Mich.—The Council proposes to improve the Fire Department.

Port Huron, Mich.—The Fire Commissioners recommend fire alarm improvements.

Owatonna, Minn. — Bonds, $15,000, are for sale for erecting a fire house.

Winona, Minn.—The addition of hydrants, also the purchase of fire ladders, is recommended.

Hattiesburg, Miss.—An electric fire alarm system is to be established.

Fargo, N. D.—The City Auditor will ask for bids for paving streets with cedar block pavement on concrete bases.

Rochester, N. Y.—Bids for two fire engines of the second class are advertised; estimated cost, $5,000 each.

Rochester, N. Y.—The Board of Governors of Masonic Temple will expend $2,500 for hose and hand extinguishers and for constructing a standpipe.

Savona, N. Y.—The city will expend $2,000 for fire engines and a hose house.

Towner, N. D.—The chemical engine and fire apparatus have been destroyed by fire.

Canton, O.—The matter of issuing $30,000 hose house bonds and $20,000 extension police and fire alarm bonds is under discussion.

Portland, Ore.—A water tower for fire protection is to be purchased.

Fleetwood, Pa.—A fire company is being organized.

Swissvale, Pa.—Bonds, $75,000, will be issued for the Fire Department.

Knoxville, Tenn.—An engine house is to be erected in the Sixteenth Ward.

Nashville, Tenn.—The City Council has prepared plans for a $7,000 engine house to be erected at Eighth avenue and Olympic street.

Salt Lake City, Utah.—The building of additional fire stations is under consideration.

Port Norfolk, Va.—A fire company is to be organized.

Waterford, Wis.—The City Council is preparing to erect a Fire Department building.

Wauwatosa, Wis.—A water-tower tank will be built at the Home of Dependent Children.

PUBLIC BUILDINGS

Auburn, Ind.—Bids will be opened, May 14, for $27,000 5 per cent. county asylum bonds.—H. D. Boozer, Auditor De Kalk county.

Albia, Iowa.—The citizens have voted to issue $26,000 bonds for school purposes.

Lafayette, La.—The question of issuing $100,000 bonds for a High School will be decided shortly.

Pocomoke City, Md.—The issue of $10,000 City Hall bonds will be made.

Stanton, Mich.—The proposition for Courthouse bonds was defeated.

Chokio, Minn.—Bonds for school improvements will be issued.

Thief River Falls, Minn.—Bonds, $16,000, will be issued for erecting a schoolhouse.

St. Peters, Minn.—A vote of the people will decide the question of issuing $25,000 school bonds.

Milan, Mo.—An election will be held, May 5, to decide the question of issuing $9,000 school bonds.

Elizabeth, N. J.—Bonds, $50,000, have been issued for erecting a school building.

Albuquerque, N. M.—The matter of issuing $30,000 City Hall bonds is under consideration.

Geneva, N. Y.—The issuance of $30,000 school bonds has been decided upon.

Newark, O.—Bids will be received May 7, for the purchase of $15,000 4 per cent. school bonds.—D. M. Keller, Clerk.

New Philadelphia, O.—An issue of $25,000 school bonds will be made.

Steubenville, O.—Bids will be opened, May 17, for a garbage crematory plant.—T. W. Vance, Clerk.

Shawnee, Okla.—Bids will be received, May 7, for the purchase of $15,000 6 per cent. 30 year school bonds.—W. S. Baker, Chairman.

Reading, Pa.—An issue of $100,000 3½ per cent. school bonds will be made.

Corpus Christi, Texas.—The Bosque and San Patricio County Commissioners will build a joint county bridge.

Norfolk, Va.—The Norfolk and Southern Railway Company will shortly ask for proposals to construct a bridge over Pamlico Sound, between Edenton and Mackeys Ferry, N. C.—M. F. King, General Manager.

Wenatchee, Wash.—The Chelan County Commissioners will build a bridge across the Wenatchee River.

Ottumwa, Iowa.—The Ottumwa Railway and Light Company will make extensive improvements.

Louisville, Ky.—The Independent Telephone Company has filed a mortgage to issue $5,000,000 bonds.

Owingsville, Ky.—An electric railway from Salt Lick is being projected.—Hon. W. A. Young. of Moreshead, Promoter.

New Iberia, La.—The Bayou Teche Traction and Power Company has been chartered with $1,500,000 for a line from New Iberia to St. Mary Parish.—J. T. White, Secretary.

Johnson City, Tenn.—The issuing of $27,000 schoolhouse bonds is under discussion.

Aquilla, Tex.—The proposition to issue $6,000 school bonds carried.

Bell, Tex.—The matter of issuing $40,000 school bonds is under consideration.

Caddo Mills, Tex.—The city will issue $7,000 in bonds for the erection of a schoolhouse.

Clairmont, Tex.—Bonds, $4,000, have been voted for improving the Courthouse.

Cooper, Tex.—Bonds, $15,000, will be issued for school improvements.

Smithville, Tex.—The matter of issuing $20,000 5 per cent. school bonds will be decided by the people.

Elm Grove, W. Va.—Bids will be received, May 15, for the purchase of $41,000 school bonds, payable in the years 1907 to 1926; interest, 5 per cent.—H. H. Hornsbrook, Commissioner.

BRIDGES

Marion, Ala.—Several small bridges throughout Perry County and a steel bridge at Fike's Ferry have been swept away.

Washington, D. C.—Proposals will be received by the United States Reclamation Service, May 15, for the construction of five bridges. Chief Engineer of Reclamation Service, Washington; R. F. Walter, Belle Fouche, S. D., Engineer.

Crown Point, Ind.—Bids will be asked for building a number of bridges in Lake County.

Indianapolis, Ind.—Bids will be received, May 7, for furnishing material and labor and constructing a reinforced concrete arch bridge.—Captain B. F. Cheatham, Constructing Quartermaster, Lawrence, Ind.

La Grange, Ind.—The County Commissioners advertise the letting of contracts for three bridges on the Stanley ditch, and abuttments for two bridges.

Wisawaka, Ind.—Two steel bridges will be built.—M. B. Ress, Commissioner.

Mason City, Iowa.—Floods have washed away numerous bridges in this locality.

Natchez, Miss.—Proposals for building a bridge at Wade's Bayou, in District No. 4, and for a bridge over Hollywood Bayou, in District No. 2; also for cutting a canal in Muddy Fork Branch, will be opened, May 6.—John F. Jekons, Clerk.

Trenton, Neb.—The Commissioners of Hitchcock County will receive bids, May 8, for construction of a wagon bridge near Trenton.—John H. Brown, Clerk.

Batavia, N. Y.—At a special election the town voted $8,000 for the erection of a bridge at Bushville.

Bridgeport, O.—The plans of the Riverside Bridge Company were accepted for the new bridge at Martin's Ferry.

Cambridge, O.—The County Commissioners of Guernsey County will receive bids, May 5, for the erection of two abutments, with wing walls for a bridge; stone or concrete to be used.

Wellsville, O.—Plans for the erection of a bridge across the Ohio are being prepared.

Lawton, Okla.—Four petitions have been granted for the construction of bridges in the county.

Pawnee, Okla.—Bids will be received, May 14, by the Board of County Commissioners for the sale of reels of 1½-inch galvanized bridge cables.—C. R. Adams, Clerk.

MISCELLANEOUS

Thomaston, Ala.—The Thomaston Brick Company will establish a brick plant; also an electric-light plant.—J. O. Clancy, President.

Nome, Alaska.—An electric power plant at Salmon Lake, on the Pilgrim River, is being planned.—W. L. Leland, Promoter.

Tucson, Ariz.—A company has been incorporated with a capial of $100,000 for the purpose of building an electric line to Fort Lowell.

De Queen, Ark.—The plant of the De Queen Light and Cold Storage Company, recently burned, will be rebuilt.

Harrison, Ark.—J. B. Quigley, of St. Louis, Mo., will construct the gas, lighting and water plant.

Little Rock, Ark.—The Anthracite & Western Railway Company will build a road from Fort Smith to Prairie View. Capital stock, $2,500,000. Directors, R. L. Remmel, F. W. Tucker, Charles McKerr, J. F. Loughborough, Geo. Heim and R. R. Chitwood.

Montgomery, Colo.—The Montezuma Valley citizens have voted the issue of $975,000 6 per cent. 20-year bonds.

Wilmington, Del.—The Pennsylvania Railway engineers will build a power house for the Philadelphia, Washington & Baltimore Railroad in Wilmington.

Chicago, Ill.—The city will issue $2,000,000 bonds for general parks and $1,000,000 bonds for small parks.

Chicago, Ill.—The Chicago and Northwestern railway will make extensive improvements on the Iowa division this year; about $320,000 will be expended.

Waukegan, Ill.—The Chicago Telephone Company will put main wires between Chicago and Milwaukee in conduits.

For Machines to Drill, Blast and Test Holes and Water Wells, write "LOOMIS CO., TIFFIN, O."

Utilities, Trade Notes and News

Sewer Pumps.—The Allis-Chalmers Company, Milwaukee, Wis., claims to have built more pumping engines and of larger capacity, for all kinds of service, than any other American builders. Their list of pumps, either in operation or in the course of construction for the city of Chicago for sewage or drainage purposes, includes eleven pumps each of a capacity varying from 12 million to 432 million gallons, and amounting in the aggregate to 1,324 million gallons per hour.

Sewer Pumps.—The A. S. Cameron Steam Pump Works, foot of East Twenty-third street, New York City, issue a neat illustrated pamphlet of steam pumps. Mentioning specially boiler feed pumps, they call attention to the sterling qualities of their pumps in workmanship and materials. The Cameron Vertical Plunger Sinking Pump is strong, certain in action and will stand rough usage. Attention is called to the recently patented priming device; it is designed to avoid rupture of the suction hose which, intended to resist collapse only, sometimes gives way. The new priming valves will not leak and become immovable.

Sewer Pumps.—The Emerson Steam Pump Company, of Alexandria, Va., publish a handsomely illustrated catalogue of their steam pumps, quick cleaning strainers and foot valves. The points of excellence claimed are that their pumps have no packing glands; are not injured by sand; have no slip or leakage even when the pumps are old; are economical in steam consumption; have no adjustments to make; do not require a sleeve on the suction pipe; have great capacity in proportion to their weight.

Sewer Pumps.—The Gould Company, 22 Canal street, Chicago, Ill., make an electrical centrifugal sewerage pump that they are setting up in a large number of places. The pump is automatic in its action and all parts are suspended from the cover so that it can be removed from the pit for inspection or repairs without the necessity of draining the pit. The company have recently shipped to the city of Houston, Tex., a pump to handle 750 gallons per minute, two to the Pennsylvania Railroad at Olean, N. Y., and two for the Buffalo, Rochester and Pittsburg Railroad, at Buffalo, N. Y., of a capacity of 1,000 gallons per minute each against 25 feet elevation.

Sewer Pumps.—The Reliance Machine and Tool Works of Franklin avenue, St. Louis, issue a catalogue of pumps for every variety of use which they manufacture under the Hooker patents. Their general service pumps have an accelerated valve movement which allows the pistons to make full strokes under any pressure and speed. Their hydraulic mine pump, Trombone pattern, is recommended for use under heavy pressure. Their vertical miner's sinking pump is simple, strong and durable and suited for general service.

Concrete Construction.—Bulletin No. 2, issued by the Association of Portland Cement Manufacturers, Philadelphia, for general distribution, contains an address read before the association by William L. Price discussing the possibilities of concrete construction, from the standpoint of utility and art.

Computing Scales.—The kind not made to cheat the customer are explained in a pamphlet by the Toledo Computing Scale Company.

Formaldehyde.—The Merchants' Association of New York have forwarded 20 barrels of formaldehyde to San Francisco, and have arranged to send 75 barrels more. The shipment will be accompanied by a supply of sprinkling cans.

Reinforced Cement Sewer Pipe.—The pipes constructed by the Reinforced Concrete Pipe Company's process are made in three-foot lengths, cast in a mold along side the ditch where they are to be laid. The novelty of the method consists in the mode of connecting the sections. Longitudinal members of the reinforced steel project into the mortised ends of the pipe in such a manner that a steel band can be introduced, thus locking the sections together. Grouting the joint finishes the process, making that portion equal in strength to any other part, and proof against seepage as well—a result difficult to obtain in the case of vitrified tile. It is claimed that this method of construction makes a water-tight sewer throughout and that the flow line is smoother than when brick is used, hence there is less resistance and the sewer constructed of reinforced concrete will carry more water. The use of this pipe is now being considered for water works and irrigation purposes, and tests with this object in view are being conducted by engineers.

Collapsible Sewer Centerings.—The steel forms made by Blaw's Collapsible Steel Centering Company, of No. 1414 Penn avenue, Pittsburg, Pa., save labor—some contractors reporting from 33 1-3 to 50 per cent. saving. They can be set up and taken down very rapidly with common labor. The concrete can be deposited so as to form a monolith and when the centerings are removed they leave behind a smooth, clean surface. The Blaw forms are leased to contractors having conduits or sewers to build.

Street Signs.—The American Street Sign Company, of Clyde, Ohio, by the invention of their perforated metallic signs and supporting devices, have arrived at a happy solution of the street naming problem. The sheet metal used, after the letters of the name are cut, are dipped in an anti-rust solution and then enameled in the color desired. The enamel will not flake or rust, in fact it cannot be removed except by acid or scraping. The signs are usually set on a 2-inch steel post, reinforced with cement to three inches. The name plate itself is supported by a bracket in any position desired.

Street Flushing Machines.—The Sanitary Street Flushing Machine Company, of St. Louis, issue a handsome catalogue. Any city desiring streets that are really clean may have them without the trouble and expense of flushing with a hose. The sanitary automatic machine takes water direct from hydrant and requires no separate device for compressing the air which forces water through the sprinkler when the machine is in use.

Proposals

FIRE ALARM BOXES

Sealed proposals will be received at the City Clerk's Office, Wilkes-Barre, Pa., until Thursday, May 3, 1906, at 12 o'clock noon, for furnishing said city with ONE THOUSAND DOLLARS worth of fire alarm boxes of the best type. Certified check for $50.00 must accompany each proposal. Proposals to be endorsed "Proposals for Fire Alarm Boxes" and to be addressed to Fred H. Gates, City Clerk. The Fire Department Committee reserves the right to reject any or all bids.

G. W. WALKER,
Joint Chairman.

POLICE ALARM SIGNAL BOXES

Sealed proposals will be received at the City Clerk's Office, Wilkes-Barre, Pa., until Thursday, May 3, 1906, at 12 o'clock noon, for furnishing said city with nine police-alarm signal boxes of the best type. Certified check for $50.00 must accompany each proposal. Proposals to be endorsed "Proposals for police boxes," and to be addressed to Fred H. Gates, City Clerk. The Joint Police Committee reserves the right to reject any or all bids.

D. W. JONES,
Joint Chairman.

STREET LIGHTING

Sealed proposals for the lighting of the streets of the Borough of Shippensburg, Pa., for one year from October 1, 1906, will be received by the Town Council of said Borough.

All bids must be in the hands of the President of Council by 8 o'clock P. M., June 7, 1906.

Council reserves the right to reject any and all bids.

S. A. ANGLE,
J. B. McGREGORY,
GEO. W. HIMES,
Light Committee.

STREET PAVING

Portsmouth, Virginia, April 3, 1906.

Sealed proposals will be received at the office of the City Clerk, Portsmouth, Va., addressed to "Street Committee," until 8 P.M., May 7, 1906, for furnishing and setting forty-one hundred (4,100') lineal feet, more or less, of five-inch granite curbing, and furnishing materials and paving ninety-nine hundred (9,900) square yards, more or less, of the following kinds of pavments: Sheet Asphalt, Vitrified Bricks, Asphalt Blocks and Bituminous Macadam, or Bitulithic, on Lincoln Street, between First and Fourth Streets, and on North Street, between Court and Green Streets.

Blank forms and instructions to bidders, together with specifications for the work, can be obtained upon application at the office of City Engineer.

The right is reserved to reject any and all bids.

E. B. HAWKS,
SAM'L T. MONTAGUE,
Chairmen Street Committee.

BASCOM SYKES,
City Engineer.

WATER WORKS

Sealed proposals will be received at the office of the Board of Trustees, "Commissioners of Waterworks," of the City of Cincinnati, Ohio, until twelve o'clock noon of Tuesday, May 8, 1906, for the construction of a Head House, Chemical House, Filter House, Valve Houses, and of a wash Water Reservoir and other miscellaneous work in connection therewith, for the Filter Plant and Settling Reservoirs, near the Village of California, in Hamilton County, Ohio.

Plans and detail drawings of the work and copies of the specifications, estimated quantities of the work to be done, form of proposal, forms of bonds, and form of contract can be secured at the office of the Chief Engineer of the Board of Trustees, "Commissioners of Waterworks."

Each bid shall be accompanied with a bond, certified check, bank certificate of deposit, or cash, in the sum of $7,500.00, for the acceptance of the contract, if awarded by the Board of Trustees, "Commissioners of Waterworks."

Bidders must furnish satisfactory evidence of their ability to do the class of work required.

AUG. HERMANN, President.
ELMER G. PRIOR, Clerk.

Municipal Civil Service Corporation

299 Broadway.
New York, April 28, 1906.

PUBLIC NOTICE IS HEREBY GIVEN that open competitive examinations will be held for the following positions in New York City, Albany and Buffalo:

Assistant Engineer, Board of Water Supply

Thursday, May 31, 1906, 10 a. m.

The receipt of applications will close on Monday, May 14, 1906, at 4 p. m.

The subjects and weights of the examination are as follows:

Technical	50
Mathematics	15
Report	15
Experience	20

The percentage required is 75 on Technical paper and 70 on all.

Candidates must state where they wish to be examined—Albany, Buffalo or New York.

Candidates should not apply for this position unless they are ready to accept employment in any part of the State where their services may be needed. Certification will not be made from the resulting eligible list to any other department, except, if necessary, to the Aqueduct Commission.

The requirements of residence in the State of New York has been waived so far as it applies to this examination.

That section of Rule VIII, requiring that applications from non-residents of the City should bear the certificates of at least two reputable citizens of the City of New York, has been waived for this examination, subject to the approval of the Mayor and the State Civil Service Commission.

The provision of Rule VII, to the effect that no person who has entered an examination for appointment to a competitive position and failed therein or has withdrawn therefrom, shall be admitted within nine months to a new examination for the same position, is waived so far as it applies to this examination.

The salary is $1,350 per annum.
The minimum age is 21.

Chainman and Rodman, Board of Water Supply

Thursday, May 31, 1906, at 10 a. m.

The receipt of applications will close on Tuesday, May 15, 1906, at 4 p. m.

The subjects and weights of the examination are as follows:

Technical	6
Mathematics	2
Experience	2

The percentage required is 75 on Technical paper and 70 on all.

Candidates must state where they wish to be examined—New York, Albany or Buffalo.

Candidates should not apply for this position unless they are ready to accept employment in any part of the State where their services may be needed. Certification will not be made from the resulting eligible list to any other department, except, if necessary, to the Aqueduct Commission.

The requirement of residence in the State of New York has been waived so far as it applies to this examination.

That section of Rule VIII, requiring that applications form non-residents of the City should bear the certificates of at least two reputable citizens of the City of New York, has been waived for this examination, subject to the approval of the Mayor and the State Civil Service Commission.

The provision of Rule VII, to the effect that no person who has entered an examination for appointment to a competitive position and failed therein or who has withdrawn therefrom, shall be admitted within nine months to a new examination for the same position, is waived so far as it applies to this examination.

The salary is $950 per annum, or over.
The minimum age is 15.

Topographical Draughtsman, Board of Water Supply.

Thursday, May 31, 1906, at 10 a. m.

The receipt of applications will close on Monday, May 14, 1906, at 4 p. m.

The subjects and weights of the examination are as follows:

Technical	5
Experience	2
Mathematics	2
Neatness	1

The percentage required is 75 on Technical paper and 70 on all.

Under "Technical Knowledge" candidates will be examined practically as to their ability to draw, letter, etc., and will be required to furnish their own drawing materials.

Candidates must state where they wish to be examined—New York, Albany or Buffalo.

Candidates should not apply for this position unless they are ready to accept employment in any part of the State where their services may be needed. Certification will not be made from the resulting eligible list to any other department, except, if necessary, to the Aqueduct Commission.

The requirement of residence in the State of New York has been waived so far as it applies to this examination.

That section of Rule VIII, requiring that applications from non-residents of the City should bear the certificates of at least two reputable citizens of the City of New York has been waived for this examination, subject to the approval of the Mayor and the State Civil Service Commission.

The provision of Rule VII, to the effect that no person who has entered an examination for appointment to a competitive position, and failed therein or who has withdrawn therefrom, shall be admitted within nine months to a new examination for the same position, is waived so far as it applies to this examination.

The salary is $1,200 to $1,650 per annum.
The minimum age is 21.

FRANK A. SPENCER,
Secretary.

SEWER AND SEPTIC TANK

Sealed proposals will be received by the Board of Local Improvements of the City of Belleville, Ill., on Tuesday, May 8, 1906, for the construction of an Intercepting Sewer and a Septic Tank, as follows:

1,527	feet	of	36-inch	Vitrified	Clay	Pipe	Sewer.	
1,803	"	"	30	"	"	"	"	"
3,885	"	"	27	"	"	"	"	"
7,465	"	"	24	"	"	"	"	"
4,350	"	"	21	"	"	"	"	"
600	"	"	18	"	"	"	"	"
60	"	"	12	"	Cast Iron Pipe.			

Forty-seven brick manholes, complete with cast-iron covers.

One Septic Tank complete.

Plans, profiles and specifications can be seen at the office of the City Engineer.

L. L. HARPER,
City Engineer.

FRED J. KERN,
President.

AGENTS WANTED

Civil engineers know that the semi-regular built road, the BUDAPEST ROAD was laid in 1875, and that it has been successfully used in DIFFICULT POSITIONS since, both THERE and IN BELGIUM and GERMANY. THE PRINCIPLE upon which this road was built has been thoroughly demonstrated by THIRTY (30) YEARS' PRACTICE.

THE AMERICAN MECHANICAL APPLICATION of this principle in road building (**The Nash Road**) has been very different. It has been COMPLETE, not semi, FAR MORE EFFECTIVE, in MANY MORE WAYS, and is VERY MUCH CHEAPER.

Agents wanted throughout the U. S. A. for this road.
Address **The Nash Road,** Borough of Brooklyn, N.Y.City.

Some Contributors to This, Other and Forthcoming Issues of the Municipal Journal and Engineer:

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EVERETT W. BURDETT, Boston, Mass.

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This Number is one upon which we may safely venture to congratulate ourselves—and we do. Good as others have been, it s perhaps the best, put out by us during the past eight years. It is well written, well illustrated and well printed. It is, however, but an indication of what we are reaching out for. We shall spare neither trouble nor expense in continuing to maintain our position that the MUNICIPAL JOURNAL AND ENGINEER is the leading publication and the only weekly one devoted exclusively to municipal matters: the recognized authority on all civic topics. We want to make it absolutely indispensable to all those engaged in the various branches of work covered by our titles, and we shall do this, even better than we have done heretofore. To this end we have secured a list of contributors whose articles, we feel certain, will be looked for and welcomed by all interested in the objects we have in view. From time to time this list will be extended and new features will be introduced. We have set a pace and shall keep step with it.